INEEL/EXT-03-00628
Revision 1

Operable Unit 3-13, Group 3, Other Surface Soils Remediation Sets 1-3 (Phase I) Health and Safety Plan

May 2005

Idaho Cleanup Project

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Revision 1
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May 2005

Idaho Cleanup Project
Idaho Falls, Idaho 83415

Prepared for the
U.S. Department of Energy
Assistant Secretary for Environmental Management
Under DOE-NE Idaho Operations Office
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ABSTRACT

This Health and Safety Plan establishes the procedures and requirements used to eliminate or minimize health and safety risks to personnel working at the Operable Unit 3-13, Group 3, Other Surface Soils Remediation Sets 1-3 (Phase I) site, as required by the Occupational Safety and Health Administration standard, "Hazardous waste operations and emergency response," 29 CFR 1910.120 and 29 CFR 1926.65. It contains information about the hazards involved in performing the work as well as the specific actions and equipment that will be used to protect personnel while working at the work site.

This Health and Safety Plan is intended to give safety and health professionals the flexibility to establish and modify site safety and health procedures throughout the entire span of site operations based on the existing and anticipated hazards. The health and safety officer supporting these activities will determine the most appropriate hazard control and required mitigation measures based on site-specific conditions and will make changes to this document as appropriate.

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ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
ALARA	as low as reasonably achievable
ANSI	American National Standards Institute
anti-C	anticontamination
APF	assigned protection factor
BLM	Bureau of Land Management
CAM	continuous air monitor
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFA	Central Facilities Area
CNS	central nervous system
COC	contaminant of concern
COPC	contaminant of potential concern
CRC	contamination reduction corridor
CRZ	contamination reduction zone
CWA	Clean Water Act
CWI	CH2M WG Idaho, LLC
DAC	derived air concentration
DAR	Document Action Request
dBA	decibel A-weighted
DEQ	[Idaho] Department of Environmental Quality
DOE	Department of Energy
DOT	Department of Transportation
DWA	designated work area
EAM	emergency action manager
EDF	Engineering Design File

EPA	Environmental Protection Agency
ER	environmental restoration
ERO	Emergency Response Organization
ES&H	environment, safety, and health
FSP	field sampling plan
FTL	field team leader
GFCI	ground fault circuit interrupter
GI	gastrointestinal
GM	Geiger-Mueller counter
HASP	health and safety plan
HAZMAT	hazardous material
HAZWOPER	hazardous waste operations and emergency response
HEPA	high-efficiency particulate air
HLLW	high-level liquid waste
HSO	health and safety officer
ICDF	INL CERCLA Disposal Facility
ICP	Idaho Completion Project
IDLH	immediately dangerous to life or health
IH	industrial hygiene
INEEL	Idaho National Engineering and Environmental Laboratory
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
ISMS	Integrated Safety Management System
JSA	job safety analysis
MCP	management control procedure
NE-ID	Department of Energy Idaho Operations Office

NEPA	National Environmental Policy Act of 1969
NIOSH	National Institute for Occupational Safety and Health
NWCF	New Waste Calcining Facility
OMP	Occupational Medical Program
OSHA	Occupational Safety and Health Administration
OU	operable unit
PCM	personnel contamination monitor
PEL	permissible exposure limit
PEP	project execution plan
PEW	Process Equipment Waste
PID	photoionization detector
PMP	project management plan
PMT	Program Management Team
POD	plan of the day
PPE	personal protective equipment
PRD	program requirements document
RadCon	Radiological Control
RAM	radiation area monitor
RBA	Radiological Buffer Area
RCIMS	Radiological Control Information Management System
RCT	radiological control technician
RD/RA	remedial design/remedial action
RCRA	Resource Conservation and Recovery Act
RFP	Request for Proposal
RG	Regulatory Guide
RMA	Radioactive Material(s) Area

ROD	Record of Decision
RW	radioactive waste
RWMC	Radioactive Waste Management Complex
RWP	radiological work permit
SAD	site area director
SAP	sampling and analysis plan
SCBA	self-contained breathing apparatus
SDA	Subsurface Disposal Area
SH&QA	safety, health, and quality assurance
SME	subject-matter expert
SNF	spent nuclear fuel
SSA	Staging and Storage Annex
STEL	short-term exposure limit
STP	Sewage Treatment Plant
STR	subcontract technical representation
SWP	safe work permit
TFR	technical and functional requirement
TLD	thermoluminescent dosimeter
TLV	threshold limit value
TPR	technical procedure
TRAIN	Training Records and Information Network
TRU	transuranic
TWA	time-weighted average
UV	ultraviolet
VD	vapor density
VOC	volatile organic compound

VPP	Voluntary Protection Program
WAC	Waste Acceptance Criteria
WAG	waste area group
WCC	Warning Communications Center
WCF	Waste Calcining Facility
WMP	waste management plan

Operable Unit 3-13, Group 3, Other Surface Soils Remediation Sets 1-3 (Phase I) Health and Safety Plan

1. INTRODUCTION

This Health and Safety Plan (HASP) establishes the procedures and requirements used to eliminate or minimize health and safety hazards to personnel working at the Operable Unit (OU) 3-13, Group 3, Other Surface Soils Remediation Phase I sites at the Idaho National Laboratory (INL). The location of the INL within the State of Idaho is shown in Figure 1-1.

1.1 Scope and Objectives

This HASP has been written to meet the requirements of the Occupational Safety and Health Administration (OSHA) standard, "Hazardous waste operations and emergency response (HAZWOPER)," 29 CFR 1910.120 and 29 CFR 1926.65. This HASP governs all work at OU 3-13, Group 3, sites performed by Clean/Close Idaho Nuclear Technology and Engineering Center (INTEC) which is part of the Idaho Completion Project (ICP) management and operations contractor personnel, subcontractors, and any other personnel who enter the project area.

Note: Subcontractors are required to follow the Subcontractor Requirements Manual (TOC-59) and the applicable program requirements documents (PRDs) specified in this HASP. While working on the project, ICP personnel are subject to the management control procedures (MCPs) and applicable PRDs specified in this HASP.

This HASP has been reviewed and revised as deemed appropriate by the Clean Close INTEC, Misc. Sites, health and safety officer (HSO) in conjunction with other project personnel and management to ensure its effectiveness and suitability.

1.2 Idaho National Laboratory Site Description

The INL, formerly the National Reactor Testing Station, encompasses 569,135 acres (889 mi^2) and is located approximately 55 km (34 mi) west of Idaho Falls, Idaho. The U.S. Department of Energy Idaho Operations Office (NE-ID)[a] has responsibility for the INL and designates authority to operate the INL to government management and operating contractors.

The United States Atomic Energy Commission, now the U.S. Department of Energy (DOE), established the National Reactor Testing Station (now the INL) in 1949 as a site for building and testing a variety of nuclear facilities. The INL also has been the storage facility for transuranic radionuclides and radioactive low-level waste since 1952. At present, the INL supports the engineering and operations efforts of DOE and other federal agencies in areas of nuclear safety research, reactor development, reactor operations and training, nuclear defense materials production, waste management technology development, energy technology and conservation programs, and DOE long-term stewardship programs.

a. NE-ID signifies that the DOE Idaho Operations Office reports to the DOE Office of Nuclear Energy, Science, and Technology (NE).

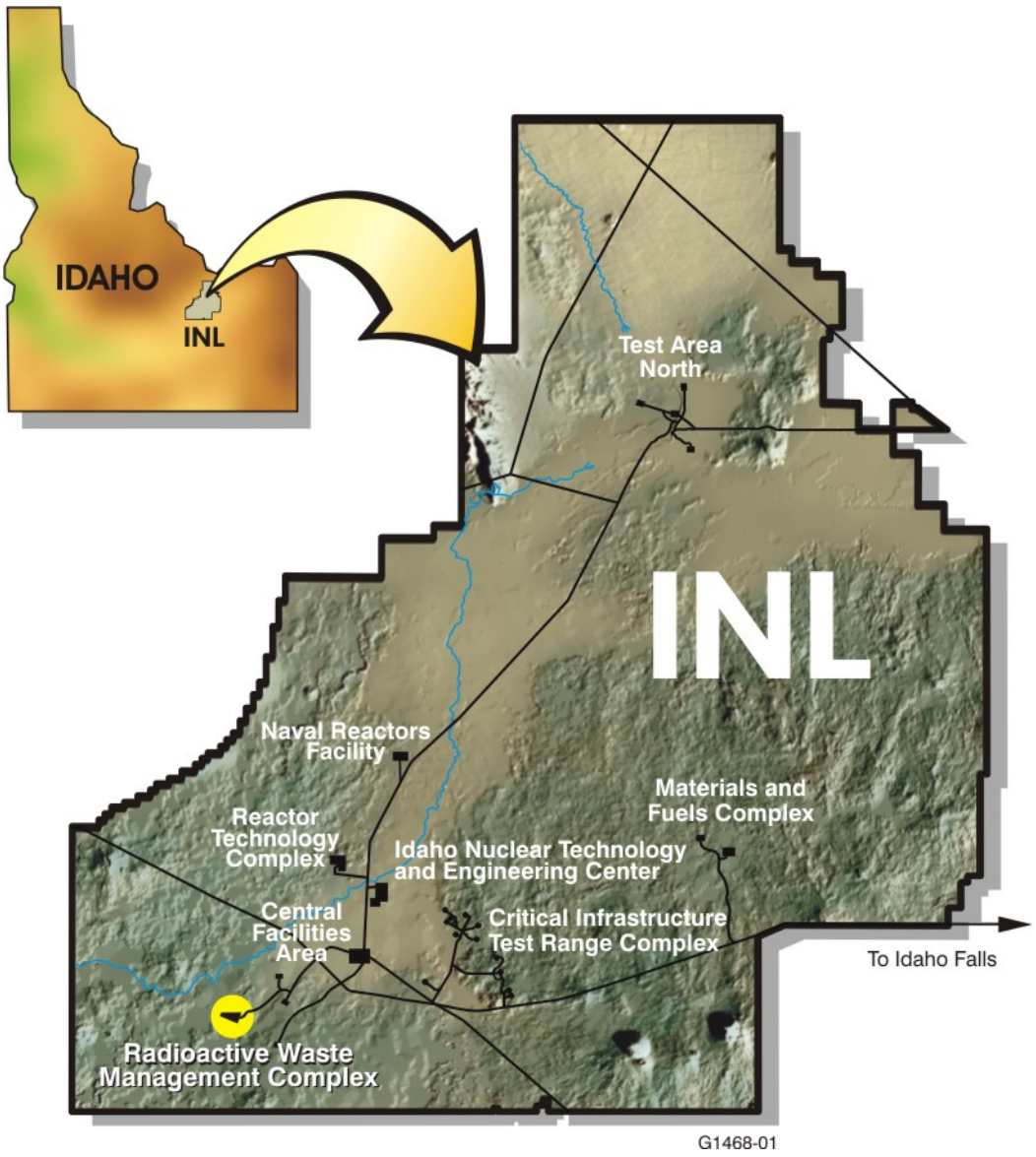


Figure 1-1. Map of the Idaho National Laboratory.

1.3 Background and Project Site Description

INTEC is located in the south-central portion of the INL (Figure 1-1). It is one of the facilities at the INL primarily dedicated to nuclear research, nuclear development, and waste management. Surrounding areas are for multipurpose use and are managed by the U.S. Bureau of Land Management (BLM). The developed area within the INL is surrounded by a 1,295-km^2 (500-mi^2) buffer zone used for cattle and sheep grazing. Communities nearest to the INTEC are Atomic City (south), Arco (west), Butte City (west), Howe (northwest), Mud Lake (northeast), and Terreton (northeast). In the counties surrounding the INL, approximately 45% is agricultural land, 45% is open land, and 10% is urban. Sheep, cattle, hogs, poultry, and dairy cattle are produced; and potatoes, sugar beets, wheat, barley, oats, forage, and seed crops are cultivated. Private individuals or the U.S. Government own most of the land surrounding the INL.

Public access to the INL is strictly controlled by fences and security personnel. State Highways 22, 28, and 33 cross the northeastern portion of the INL approximately 32.2 km (20 mi) from INTEC, and U.S. Highways 20 and 26 cross the southern portion approximately 8 km (5 mi) from INTEC. A total of 145 km (90 mi) of paved highways pass through the INL and are used by the general public.

The INTEC began operating in 1952. The primary missions were to reprocess uranium for defense purposes and to research and store spent nuclear fuel (SNF). Irradiated defense nuclear fuels were reprocessed to recover unused uranium. In 1992, the reprocessing mission was phased out. The current INTEC mission is to receive and temporarily store SNF and radioactive wastes for future disposition.

In addition to reprocessing SNF, INTEC stabilized high-level liquid waste (HLLW) from fuel reprocessing through a process known as calcination. That processing was conducted in a facility known as the Waste Calcining Facility (WCF) where radioactive HLLW was converted into a granular solid similar in consistency to sand. The liquid waste was drawn from underground storage tanks at the tank farm and sprayed into a vessel superheated by a mixture of kerosene and oxygen. Most of the liquid would evaporate, while radioactive fission products adhered to the granular bed material in the vessel. The off-gases were treated and monitored before they were released to the environment. The calcined solids were transferred to large stainless steel structures encased in thick concrete vaults (bin sets). Calcining achieve an eight-to-one volume reduction from liquid to solid. Although processing of nuclear fuel was terminated in 1992, calcination of the HLLW continued until it was completed in February 1998. Sodium-bearing wastes are still being processed. The WCF was replaced in 1982 by another similar unit, the New Waste Calcining Facility (NWCF).

Releases of radioactive and hazardous materials to the environment have occurred over the past decades due to accidents and intentional operational releases, such as discharge of radionuclide-contaminated wastewater beneath the INTEC via the former injection well. Although these operational releases fail to meet contemporary standards, past intentional discharges did meet rules and standards of the time.

To better manage environmental investigations, the INL was divided into 10 waste area groups (WAGs). Identified contaminant release sites in each WAG were grouped into OUs to expedite the investigations and any required remedial actions. The INTEC was designated as WAG 3 and was subdivided into 13 OUs that were investigated for contaminant releases to environmental pathways. Fifty-five (55) WAG 3 (OU 3-13) sites were identified as posing a potential carcinogenic risk greater than 1×10^{-4} or threat to human health and/or the environment. These sites require remedial action to mitigate these risks or threats. Ten (10) of the 55 sites were included in OU 3-13, Group 3, Other Surface Soils Remediation Sets 1-3, Phase I sites.

1.4 Scope of Work

The Other Surface Soils release sites contain wastes with the potential to expose workers, the environment, and the public to radionuclide-contaminated soils. Exposure to radionuclides at these sites must be minimized to allow these sites to be released for unrestricted use in the future. The selected remedy for Other Surface Soils is removal and on-Site disposal in the INL CERCLA Disposal Facility (ICDF).

For Cs-137, contaminated soils will be cleaned up to below 23 pCi/g, for the future residential use scenario. The background Cs-137 activity is approximately 1 pCi/g, which is equivalent to a 10^{-5} excess carcinogenic risk. The acceptable risk for cleanup to future residential standards for Cs-137 is 1×10^{-4} by the year 2095. “No Further Action” sites that represent a threat if land use was residential but do not represent a threat under an industrial land use scenario.

Contaminated soil and debris from Group 3 sites will be removed using the following conventional excavation methods:

1. Remove contaminated soils and debris above the 1×10^{-4} (23-pCi/g) risk level based on an assumed future residential use in the year 2095 and beyond, and replace with clean soil so that, from the surface to a depth of 3 m (10 ft), the land can be released for future residential use. Contamination below 3 m (10 ft) may also be excavated at the discretion of the DOE, if determined to be more cost effective than maintaining necessary institutional controls to prevent future drilling through deep contamination zones and transportation of contaminants to the underlying aquifer. In addition, excavation activities below the 3 m (10 ft) depth that could cause the movement of contaminants either to the surface or to the underlying aquifer will be controlled.

2. Transport contaminated soils and debris to the ICDF for disposal. The ICDF is located within the WAG 3 area of contamination.

3. Survey and record contamination left in place at depths below 3 m (10 ft) for future institutional controls, as necessary.

4. Replace excavated soils with clean backfill and re-grade.

1.4.1 Remediation Sites

This remediation project will be completed in two phases. The Phase I, Group 3, soil sites at INTEC appear as green shaded areas in Figure 1-2. This HASP addresses only the sites included in Remediation Sets 1, 2, and 3, which will be completed under Phase I. The remaining sites in Sets 4, 5, and 6 will be completed later under Phase II.

1.4.1.1 Remediation Set 1

CPP-97—Located in the northeast corner of INTEC, this site consists of two tarp-covered soil stockpiles that originated in the tank farm area and the adjacent surface soils around the stockpiles. The southern boundary of the site is Palm Avenue, the northern boundary is Chestnut Avenue, and the eastern boundary is Lodge Pole Street.

The stockpiles were generated during the 1993 to 1995 HLLW tank farm upgrade project during which several areas of the tank farm were excavated. The soils were monitored for radionuclides during

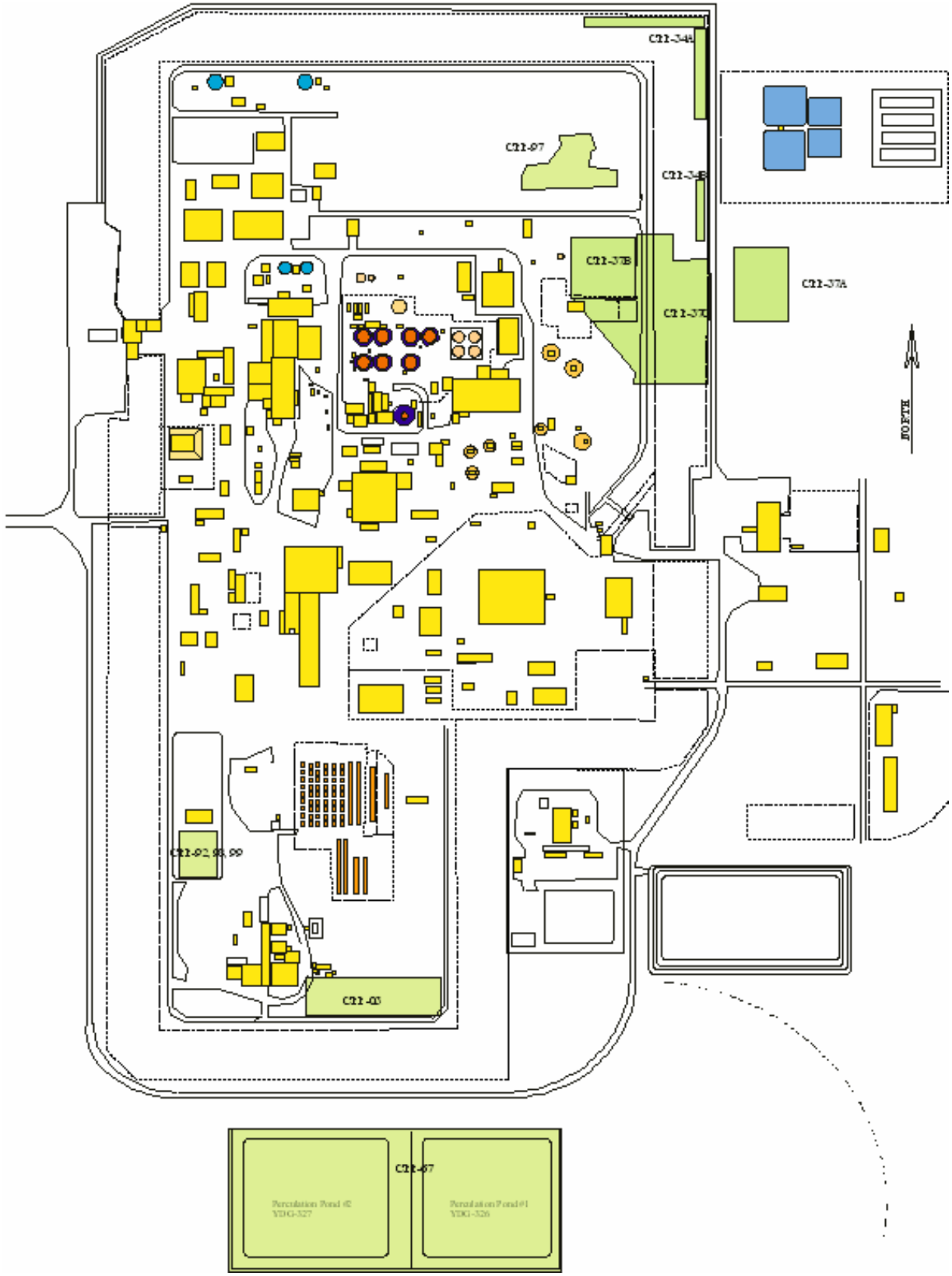


Figure 1-2. Map of the Group 3, Other Surface Soils sites, at INTEC.

excavation. Based on the activity concentration, the soils were segregated into separate piles. The contact readings on the larger 1,090-m^3 (1,430-yd^3) stockpile were 0 to 3 milliroentgen-equivalent man per hour (mrem/hr). The contact readings on the smaller 53-m^3 (70-yd^3) stockpile were 3 to 50 mrem/hr. Additional 3- to 50-mrem/hr soils were placed in 0.6- × 1.2- × 2.4-m (2- × 4- × 8-ft) boxes and transported to the WAG 3 Staging and Storage Annex (CPP-1789).

Potential contaminants contained in the stockpiled soils include radionuclides and suspected listed wastes. Contaminant concentrations are expected to be similar to those found in the CPP-89 and CPP-92 soils.

CPP-92—This site consists of a group of 53 soil boxes west of CPP-1617 containing soil and debris contaminated with low levels of radioactive materials. The 0.6- × 1.2- × 2.4-m (2- × 4- × 8-ft) and 1.2- × 1.2- × 2.4-m (4- × 4- × 8-ft) boxes are constructed of 1.9-cm (0.75-in.) plywood lined with a polyethylene membrane. The soils were generated during various INTEC activities, including the tank farm upgrade, Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) remediation projects, the CPP-603 cleanup, and excavations at INTEC where soil contamination was encountered. Most of the boxes contain soil with such low levels of contamination that the Radioactive Waste Management Complex (RWMC) will not accept the waste for disposal.

Boxed soil from the excavation for the fire exit from Building CPP-604/605 was sampled and analyzed for inorganics, VOCs, and radionuclides. The contaminants of potential concern (COPCs) identified from contaminant screening for the various excavation activities included arsenic, Am-241, Cs-134, Cs-137, Co-60, Eu-152, Eu-154, I-129, Np-237, Pu-238, Pu-239/240, Sr-90, Sb-125, U-234, and U-235. Volatile organics were not detected in the samples. The only inorganics detected above background were arsenic at 5.9 mg/kg and mercury at 10.4 mg/kg. Mercury was below the U.S. Environmental Protection Agency (EPA) Region III risk-based soil concentrations of 23 mg/kg residential, noncarcinogenic soil screening level. These contaminations are consistent with the types of contaminants contained in the service wastes and condensates from the Process Equipment Waste (PEW) evaporator that have historically included nitric acid, mercury, plutonium, cesium-137, and strontium.

The soil and debris are contained in polyethylene-lined boxes that have not deteriorated. Therefore, it is assumed that significant amounts of contaminated soil have not leaked from the boxes and that lateral and vertical contaminant migration from the box staging area has not occurred. Assuming that the boxes are 80% full, there is a total of approximately 1,000 m^3 (1,300 yd^3) of soil in the boxes.

CPP-99—This site consists of soil in fifty-eight, 0.6- × 1.2- × 2.4-m (2- × 4- × 8-ft) wooden boxes. The soils were generated during the 1993 to 1995 HLLW tank farm upgrade project. In addition, some boxes contain soils generated during the CPP-605 Egress Tunnel project. Several factors contributed to contamination of the soils, including the following:

- Accidental releases and leaks through INTEC process piping beneath CPP-605 and the tank farm
- Cross contamination through tank farm operational and maintenance excavations
- Fallout from years of operating the INTEC main stack
- Migration of contamination from INTEC tank farm valve boxes and vault stumps via vent tubes prior to 1970
- Windblown contamination from releases outside the tank farm.

The boxed soils were generated and managed as low-level radioactive waste from 1993 through 1995. However, the tank farm and CPP-604 facilities have listed waste codes associated with each area. Therefore, the boxes of soil may contain radioactive and potentially listed constituents and are managed as such.

CPP-98—Wood and metal shoring material from the 1993 to 1995 HLLW tank farm upgrade project are stored in one hundred nineteen, 1.2- × 1.2- × 2.4-m (4- × 4- × 8-ft) and 0.6- × 1.2- × 2.4-m (2- × 4- × 8-ft) wooden boxes. The upgrade project generated and managed the boxes of shoring material as low-level radioactive waste. However, the tank farm area soil contains radioactive and potentially listed constituents. Therefore, the boxes of shoring material are assumed to contain radioactive and listed constituents.

1.4.1.2 Remediation Set 2

CPP-37B—This gravel pit and debris landfill inside the INTEC security fence measures approximately 79 m (260 ft) × 116 m (380 ft) × 7.9 m (26 ft) with an area estimated at 9,179 m^2 (98,800 ft^2). Prior to 1982, this pit was often used to dispose of waters released from the sludge dewatering pit of the old Sewage Treatment Plant (STP) (CPP-715). After 1982, the pit was used to dispose of construction debris, some of which may have been contaminated with radionuclides. Anecdotal information suggests that the pit may also have been used for disposal of chemical wastes. The year the pit was backfilled is unknown. Modeling and sampling of the site indicated the pit is not a significant contributor to groundwater risk or surface exposure risk. However, since the pit was used as a landfill, characterization is considered insufficient to recommend no further action.

CPP-37C—An area with radioactively contaminated debris was discovered southeast of CPP-37B during excavation to install a culvert for the OU 3-13 Group 1 Tank Farm Interim Action between November 20 and 27, 2000. The culvert was installed along the east perimeter road between two INTEC fences. Debris consisting of lava rock, gravel, and soil with minor quantities of concrete, plywood, pipe, and plastic was found southeast of CPP-37B just inside the outer fence at a beginning depth (bottom of the excavation) of 1.5 to 1.8 m (5 to 6 ft). The debris occupies an excavation that is approximately 10.7 m (35 ft) × 110 m (360 ft) × 4.3 m (14 ft). The debris is most prevalent along the west edge of the trench. While the extent of the debris is not definitively known, it is suspected that it extends to the west, based upon the observed concentration of debris along the west edge of the trench.

Radiological contamination was found on some of the materials that had been removed from the excavation. This contamination ranged from 35,000 disintegrations per minute (dpm) fixed beta-gamma to a maximum of 100,000 dpm fixed beta-gamma contamination. The COPCs associated with this site include the radionuclides associated with the construction debris. This site is similar to CPP-37B in that it was used to dispose of material such as excess soil, concrete, basalt boulders, and piping removed or generated during construction activities in preparation for INTEC infrastructure projects. The contaminants are expected to be similar to those found at CPP-37B.

1.4.1.3 Remediation Set 3

CPP-03—This temporary storage area southeast of CPP-603 was used to store radioactively contaminated old and abandoned equipment. When the area was decommissioned in the later 1970s, all stored material was boxed and sent to the RWMC for disposal, and the area covered with 28 cm (11 in.) of "cold" soil. Subsequently, 9,175 m^3 (12,000 yd^3) of contaminated soil excavated from the tank farm was stockpiled at the site before burial in three trenches located at the northeast corner of INTEC.

Radiological field surveys in the area indicated surface activity levels above background at various locations at the site. Samples were collected and submitted for radionuclide analyses. The results indicated the primary contaminants of concern were Cs-137 and Sr-90, which were detected from the surface to about 1.2 m (4 ft). The estimated extent of the contamination is 6,970 m^2 (75,000 ft^2) with an estimated volume of 4,600 m^3 (6,000 yd^3).

CPP-37A—Gravel Pit (#1) outside the INTEC security fence measures approximately 43 m (140 ft) × 64 m (210 ft) × 4.3 m (14 ft) deep. Information about early usage is not available; however, the pit was used as a decontamination area of radionuclide-contaminated construction equipment during July and August 1983. During 1982 and 1983 the pit was used as a percolation pond for INTEC service wastewater while refit of the injection well was completed. Currently, Pit #1 receives stormwater runoff from INTEC.

Based on contaminant screening completed in 1991, identified contaminants of primary concern were arsenic, Co-60, Am-241, Cs-137, Np-237, Pu-238, Sr-90, U-235, and U-238. Note that arsenic was detected above the background level of 5.8 mg/kg in eight out of the 14 samples collected. The maximum concentration detected was 8.7 mg/kg.

The radionuclide contamination zone in Pit #1 is assumed to extend from 0 to 3 m (0 to 10 ft) over the 2,731-m^2 (29,400-ft^2) area of the pit.

CPP-67—Unlined percolation Ponds 1 and 2 receive service wastewater consisting primarily of cooling water and condensed steam generated by various INTEC operations. The wastewater is monitored before being discharged to either pond. Measured radioactivity in the wastewater ranges from zero to only a trace. The ponds are fenced to exclude large wildlife entry and unauthorized personnel.

Pond 1, established in 1984, is located southeast of CPP-603, outside the south INTEC security fence. The pond is approximately 125 m (410 ft) in the east-west direction, 146.3 m (480 ft) in the north-south direction, and about 5.5 m (18 ft) deep. The pond was excavated in gravelly alluvium that is approximately 7.6 to 9.1 m (25 to 30 ft) thick and is underlaid by basalt, which locally outcrops in the pond.

Pond 2, adjacent to Pond 1, was established in 1985 after it became apparent the Pond 1 infiltration capacity had decreased and water levels began to rise. Pond 2, at the toe of its slope, is about 154.2 m (500 ft) square and 3 to 4 m (12 to 14 ft) deep. The pond was excavated in gravelly alluvium that is approximately 6 to 11 m (20 to 35 ft) thick and is underlaid by basalt, which locally outcrops in one corner of the pond. The pond was designed to accommodate continuous wastewater flows around 11.4 M L (3 M gal) per day.

A Resource Conservation and Recovery Act (RCRA) clean-closure equivalency was achieved for metals contamination in Pond 1 in April 1994 and in Pond 2 in May 1995; therefore, only radionuclide contamination was assessed as part of the WAG 3 remedial investigation/baseline risk assessment. Based on the investigative results, the zone of contamination for Pond 1 is estimated to be about 1.8 m (6 ft) thick and extends from the surface to 1.8 m (6 ft) below ground surface. The volume of contaminated soil, using the Pond 1 dimensions, beneath the pond was estimated to be 14,500 m^3 (19,000 yd^3).

The zone of contamination for Pond 2 is assumed to be 1.8 m (6 ft) thick and extends from the surface to 1.8 m (6 ft) below ground surface. The volume of contaminated soil beneath the pond, using the Pond 2 dimensions, was estimated to be 8,400 m^3 (11,000 yd^3).

CPP-34A/B—This site consists of soil storage areas (disposal trenches) in the northeast corner of INTEC covering 4,366 m^2 (47,000 ft^2). In 1984, radionuclide-contaminated soil at levels up to 30 mR/hr were removed from a pile east of CPP-603 and disposed of in the trench. The soil was originally excavated from Site CPP-33. Contaminants consist of nitric acid and radionuclides, including Cs-137, U-234, U-238, Np-237, Sr-90, and Pu-238.

The Integrated Waste Tracking System Material and Waste Characterization Profile No. 4529Q for CPP-03 and CPP-34A/B Soils indicates free aqueous solutions or acid gases are not characteristic of the soils.

Based on investigative results, the primary contaminants of concern are Cs-137 and Sr-90 with average concentrations of 396 pCi/g and 813 pCi/g, respectively. The zone of contamination assumed for this site is from 0 to 61 m (0 to 20 ft) with an estimated volume of 46,600 m^3 (61,000 yd^3). An average width of the trench (10.7 m [35 ft]) was used to calculate soil volumes, as the width of the trench varied from 7.6 to 13.7 m (25 to 45 ft).

1.4.2 Work Steps for Site Excavation

The OU 3-13 site area excavation, waste removal, mass backfill, final grading and contouring, and final site restoration or revegetation operations are sequenced in Steps 1 through 12 as outlined below. These sequencing steps are subject to change based upon the detailed sequencing submitted by the subcontractor performing the work. Estimated soil quantities for mass excavation backfill and recontouring activities are included on the design drawings. Steps are as follows:

- Step 1—Site Mobilization
- Step 2—Establishment of Perimeter Fencing and Site Boundary
- Step 3—Establishment of Decontamination Areas and Systems
- Step 4—Characterization/Sampling Activities
- Step 5—Location and Isolation of Utilities
- Step 6—Mass Excavation
- Step 6a—Excavation of OU 3-13 Site Area Limits to Design Depths or 10 ft 0 in. bgs
- Step 6b—Iterative Excavation and Soil Screening to Meet Regulatory Guides (RGs) or 10 ft 0 in. Below Design Excavation Limits
- Step 7—Final Field Verification Sampling of Excavation
- Step 8—Placement of Excavation into Stable Condition Waiting for Sampling Laboratory Analysis
- Step 9—Mass Backfill Operations
- Step 10—Installation of Final Permanent Utilities/Structures
- Step 11—Final Grading and Contouring/Placement of Finish Grade Gravel or Placement of Topsoil and Revegetation

- Step 12—Removal of Decontamination Areas/Fencing/and other Temporary Construction
- Step 13—Demobilization from Site.

The sites that will undergo mass excavation operations are CPP-97, -34A, -34B, -03, and -67 (Evaporation Ponds 1 and 2).

Requirements for vendor data submittals, training, and medical information specified by the construction specifications and INL-specific requirements will be provided in the Request for Proposal (RFP). The subcontractor will provide required documentation, bonds, insurance, and proof that all required training and medical examinations are complete as per the HASP (Attachment 4 of the Group 3 RD/RA Work Plan submittal [DOE-ID 2004a]) before the subcontractor will be allowed to mobilize. These submittals will certify that the subcontractor can meet and satisfy the requirements of the RFP and the project.

1.4.2.1 Site Mobilization (Step 1). Mobilization is the work performed in preparation for construction activities. This work generally implements the project and site-required administrative, engineering, and health and safety controls. Mobilization will include such activities as setup of site offices; demarcation of parking areas, equipment and material lay down areas, and work zones; and installation of signs, postings, and fences. Required lay down areas, work zones, and postings will be set up and maintained for each phase of the remediation. Coordination of the remediation activities will be required between contractor, subcontractor, and facility personnel to ensure that these activities have minimal impact on facility operations and maintenance.

Site preparation includes utility identification and isolation, security fencing/barrier installation (if necessary), site layout and surveying, establishment of storm water runoff barriers and collection points, set up of a temporary decontamination station, set up of dust control operations, and any required air monitoring. These activities are briefly discussed in the following sections.

1.4.2.2 Establishment of Perimeter Fencing and Site Boundary (Step 2). Temporary security barriers and/or fencing and access-control fencing will be installed to restrict access by wildlife or unauthorized personnel into the work area and to prevent drilling and heavy equipment from driving over subsurface structures. Existing barriers and/or fencing that will be impacted by remediation activities will be removed and/or relocated where necessary. Existing fencing around portions of the site may be used to establish the access control boundary. Ingress and egress control of contaminated areas will be defined in the HASP (Attachment 4) under security fencing.

1.4.2.3 Establishment of Decontamination Areas and Systems (Step 3). The remediation operations will establish appropriate equipment and transport vehicle decontamination areas and/or systems as necessary to assure the containment of contamination within the specific site boundary. This delineation is necessary to assure that contamination is not spread from the specific site boundary to the surrounding areas at INTEC and transportation roadways to the ICDF for waste disposal.

These decontamination areas and systems will be delineated after the award of the remediation subcontract and will use the best available technology to provide adequate decontamination of equipment and transport vehicles while minimizing the generation of secondary waste streams.

1.4.2.4 Characterization/Sampling Activities (Step 4). Soil characterization may be accomplished by the use of direct-push probes prior to and/or concurrent with general excavation operations. Further information for direct-push probes is provided in Section 2.6 below.

1.4.2.5 Location and Isolation of Utilities (Step 5). The specific site utilities will be located in the field using the existing as-built engineering drawings and physical surveys of field conditions. These utilities will be isolated and demolished as shown on design drawings to allow the excavation to be completed to the required depth to meet the RGs. Once the remediation has been accomplished, these utilities will be re-installed as shown on the design drawings prior to and/or in conjunction with backfill operations.

1.4.2.6 Mass Excavation (Step 6). Field screening using a gamma spectrometer will be performed during the excavation. The flow chart presented in Section 5 of this Work Plan (DOE-ID 2004a) will be followed to determine when the excavation is complete. Note that there will be no excavation into basalt.

The general sequencing of mass excavation activities is as follows:

- Excavation will typically proceed in 1-foot lifts (to minimize the excavation quantities while removing contamination greater than the RGs and to minimize placement of noncontaminated materials that could be used for backfill materials into the ICDF landfill) (Step 6a).

- A water truck or other forms of water distribution equipment will be used for dust control (additional water spray systems may be required at the dig face during excavation operations).

- Material will be excavated and moved to the edge of the excavation for loading into selected transportation equipment.

- Roll-offs with plastic liners or dump trucks with solid formed dump beds (designed to avoid leakage of materials) will be loaded by the tracked excavator or loader and moved to the decontamination station without entering the zone of contamination.

- Loaded roll-offs or dump trucks will be surveyed for radiological contamination and be dry decontaminated, if necessary. Any dirt or mud on the truck chassis will be removed by the laborers working at the decontamination station.

- An option for dump trucks not using a foldable plastic cover is to spray a water-soluble fixatant on truck loads to maintain surface integrity and provide dust control. Spray fixatant will require an exception from ICDF Operations since this system is not currently specified in the ICDF landfill Waste Acceptance Criteria (WAC). Only tarp-covered loads (a more time-consuming option than the spray fixatant) are currently specified for trucks hauling bulk waste materials to ICDF.

- The roll-offs or transport trucks will transfer the waste soil and debris to the ICDF, where ICDF Operations will review the waste manifests, accept the truck, and dispose of the waste.

- Field screening and contamination removal accomplished by additional excavation of hot spots to the preestablished 10 ft 0 in. bgs or design depth are iterative processes that must be worked dependent upon field conditions (Step 6b).

1.4.2.7 Final Field Verification Sampling and Geophysical Survey of Excavation (Step 7). The final field verification sampling will be performed to verify that RGs have been met as described in the Field Sampling Plan (FSP) (DOE-ID 2004b) (Attachment 1 of the Group 3 RD/RA Work Plan submittal [DOE-ID 2004a]). The excavation will be surveyed to establish backfill material needs.

1.4.2.8 Placement of Excavation into Stable Condition waiting for Sampling Laboratory Analysis (Step 8).

The excavation will be placed into a safe and stable configuration to allow the excavation to remain open until the final field compliance sample results are verified and validated (a period of 30 to 90 days depending upon certified laboratory backlog and schedule).

1.4.2.9 Mass Backfill Operations (Step 9).

Following verification that the RGs have been met, the excavation may be backfilled, as described in design earthwork specifications. Backfill will be placed and compacted to meet the requirements of the earthwork specification for future use of the site.

1.4.2.10 Installation of Final Permanent Utilities (Step 10).

Utilities will be re-installed and tested as required. Security barriers/fencing and animal control fencing will be reinstalled as required. Utility re-installation will be performed in conjunction with backfill operations.

1.4.2.11 Final Grading and Contouring/Placement of Finish Grade Gravel or Placement of Topsoil and Revegetation (Step 11).

Final grading and contouring of the site topography as required by the design drawings and placement of topsoil and revegetation of those sites requiring such (Site CPP-67) will be performed.

1.4.2.12 Removal of Decontamination Areas/Fencing/and other Temporary Construction (Step 12).

Removal of the temporary decontamination station will include final sampling and transfer of wash water to the ICDF evaporation pond for disposal per the project Waste Management Plan (WMP) (DOE-ID 2004c) (Attachment 6 of the Group 3 RD/RA Work Plan submittal [DOE-ID 2004a]).

1.4.2.13 Demobilization from Site (Step 13).

Site cleanup and demobilization will include completion of the final site punch-list, removal of equipment, and re-posting of the site boundary.

1.4.3 Remediation—Boxed Waste Transfer Operations

The sites that will undergo boxed waste transfer operations are CPP-92, -98, and -99. These waste boxes are currently located in the Staging and Storage Annex (SSA) CPP-1789. These boxes are in good physical condition and are currently inspected weekly under the agency-approved WMP for the SSA (DOE-ID 2003). This remedial operation will be fairly simple and straightforward, consisting of transporting boxed waste from SSA CPP-1789 to the ICDF. This is a routine waste-handling operation and existing procedures are in place to cover such work.

The general sequencing of operations for this remedial action is outlined below:

- Boxes will be presorted prior to collecting additional characterization samples
- Additional characterization samples will be collected and analyzed per the Characterization Plan (DOE-ID 2004d) (Attachment 3 of the Group 3 RD/RA Work Plan submittal [DOE-ID 2004a])
- Waste profiles will be developed and a determination made regarding ICDF WAC acceptability and/or applicability for stabilization to meet LDRs
- Soil and debris waste boxes will be transferred to ICDF for direct disposal and/or to the Staging, Storage, Sizing, and Treatment Facility within the ICDF Complex for treatment, as necessary.

1.4.3.1 Transfer of Soil and Debris Waste Boxes to ICDF. The specific sequencing of operations associated with the transfer of the soil and debris waste boxes to the ICDF from CPP-1789 is outlined below. Soil and debris box sequences are presented separately.

- Waste Soil Boxes

  - A site boundary of sufficient size will be established to allow staging of a transport trailer and tractor unit outside of CPP-1789.

  - A forklift with sufficient capacity will be used to move boxes from CPP-1789 and load them onto the tractor-trailer unit. Loading will be limited by weight loading restriction on tractor-trailer unit.

  - The load will be tied down and secured to the trailer unit and a final radiological survey performed for release.

  - The tractor-trailer unit will be driven from the CPP-1789 site boundary to ICDF.

  - The tractor-trailer unit will enter ICDF and proceed to the truck scale for weighing.

  - The tractor-trailer unit will proceed as directed to the staging area to drop off the trailer. ICDF operations personnel will unload the trailer at a later time or as directed to the ICDF active cell for direct unloading.

  - If directed to the ICDF active cell for direct unloading, the tractor-trailer will go to the decontamination facility for decontamination prior to final weighing.

  - The tractor-trailer will proceed from ICDF to the CPP-1789 site boundary for waste box loading operations.

- Waste Debris Boxes

  - A site boundary of sufficient size will be established to allow staging of a transport trailer and tractor unit outside of CPP-1789.

  - A forklift with sufficient capacity will be used to move boxes from CPP-1789 and load them onto the tractor-trailer unit. Loading will be limited by weight loading restrictions on the tractor-trailer unit.

  - The load will be tied down and secured to the trailer unit and a final radiological survey performed for release.

  - The tractor-trailer unit will be driven from the CPP-1789 site boundary to ICDF.

  - The tractor-trailer unit will enter ICDF and proceed to the truck scale for weighing.

  - The tractor-trailer unit will proceed as directed to the staging area to drop off the trailer. ICDF operations personnel will unload the trailer at a later time or unload the boxes and place them directly in the staging area.

- The tractor-trailer unit will go to the decontamination facility for decontamination prior to final weighing.

- The tractor-trailer unit will proceed from ICDF to the CPP-1789 site boundary for waste box loading operations.

2. HAZARD IDENTIFICATION AND MITIGATION

This section identifies existing and anticipated chemical, radiological, safety, and environmental hazards based on the Operable Unit 3-13, Group 3, Other Surface Soils, Remediation Phase I scope of work and provides controls to eliminate or mitigate these hazards. This will enable project management and safety and health professionals to make effective and efficient decisions regarding the equipment, processes, procedures, and allocation of resources to protect the safety and health of project personnel.

The following method was used to identify the hazards and the most effective way to mitigate them:

- Evaluate each project task to determine the safety hazards and radiological, chemical, and biological exposure potential to project personnel by all routes of entry
- Establish the necessary monitoring and sampling required to evaluate exposure and contamination levels, determine action levels to prevent exposures, and provide specific actions to be following if action levels are reached
- Determine the necessary engineering controls, isolation methods, administrative controls, work practices, and personal protective equipment (PPE) to further protect project personnel from hazards.

The magnitude of or danger presented by hazards to personnel entering work zones is dependent on both the nature of tasks being performed and the proximity of personnel to the hazards. Engineering controls will be implemented (whenever possible) along with administrative controls, work practices, and PPE to mitigate potential exposures and hazards. Hazard mitigation provided in this section in combination with other work controls (e.g., technical procedures [TPRs], work orders, job safety analysis, and GDE–6212, "Hazard Mitigation Guide for Integrated Work Control Processes") will be used, where applicable, to eliminate or mitigate project hazards.

2.1 Chemical and Radiological Hazards and Mitigation

Personnel may be exposed to chemical and radiological hazards while working at the OU 3-13, Group 3, Other Surface Soils Remediation Phase I sites. Table 2-1 lists the worker health-based chemical contaminants of concern (COCs) that may be encountered while conducting project tasks. Table 2-2 lists the worker health-based radiological COCs that may be encountered during project tasks. Table 2-3 lists the exposure limits, routes of entry, target organs, level of carcinogen exposure, and matrix or source of contaminant for the dominant radioisotopes. Table 2-4 outlines the activities, associated hazards, and hazard mitigation elements.

Table 2-1. Worker health-based chemical contaminants of concern.

Chemical or Compound	Matrix or Source	Average Level Detected (mg/kg)[a]	Maximum Level Detected (mg/kg)	On-Site Background (mg/kg)[b]
Ag	CPP-03	NA[c]	NA	NA
	CPP-34	2.2	2.5	0
	CPP-37B	4.19	8.5	NA
	CPP-67	2.91	18	NA
Pb	CPP-03	NA	NA	NA
	CPP-34	14.1	132	17
	CPP-37A	11	17.7	NA
	CPP-37B	9.6	22.6[d]	NA
	CPP-67	8.49	19.5[d]	NA
Hg	CPP-03	NA	NA	NA
	CPP-34	0.35	0.6	0.05
	CPP-37A	0.57	0.96	NA
	CPP-37B	0.12	0.12[d]	NA
	CPP-67	12.6	126[d]	NA
Bis (2-ethylhexyl) phthalate	CPP-03	NA	NA	NA
	CPP-34	0.54	0.62	NA
	CPP-37B	0.24	0.24[d]	NA
	CPP-67	1.31	3.7	NA
Se	CPP-34	0.7	0.7	0.22
	CPP-37A	0.234	0.41	NA
	CPP-37B	0.281	0.65	NA
	CPP-67	0.388	0.8[d]	NA
As	CPP-34	NA	7.1	5.8
	CPP-37A	5.83	8.7	NA
	CPP-37B	4.42	11.4[d]	NA
	CPP-67	4.52	13.8	NA
Methylene chloride	CPP-37A	0.0893	0.14	NA
	CPP-37B	0.12	0.29	NA
	CPP-67	0.00963	0.024[d]	NA
Toluene	CPP-37A	0.001	0.001[d]	NA
	CPP-67	0.001	0.001[d]	NA
1,1,1-Trichloroethane	CPP-37A	0.005	0.005[d]	NA
	CPP-67	0.001	0.001[d]	NA
Ba	CPP-37B	126	468	300
	CPP-67	144	400	NA
Cd	CPP-37B	1.22	3.2	2.2
	CPP-67	1.82	11.2	NA
Cr	CPP-37B	18.5	42.6	33.0
Kepone	CPP-37B	0.07	0.07[d]	NA
Acenaphthene	CPP-37B	0.037	0.037[d]	NA

Table 2-1. (continued).

Chemical or Compound	Matrix or Source	Average Level Detected (mg/kg)[a]	Maximum Level Detected (mg/kg)	On-Site Background (mg/kg)[b]
Fluorene	CPP-37B	0.061	0.061[d]	NA
Pyrene	CPP-37B	0.21	0.21[d]	NA
Benzo (a) Anthracene	CPP-37B	0.072	0.072[d]	NA
Phenanthrene	CPP-37B	0.4	0.4	NA
Anthracene	CPP-37B	0.35	0.35	NA
Fluoranthene	CPP-37B	0.22	0.22[d]	NA
Chrysene	CPP-37B	0.11	0.11[d]	NA
Aroclor 1254	CPP-37B	0.23	0.23	NA
Aroclor 1260	CPP-37B	0.42	0.42	NA
Cu	CPP-67	24.3	149[d]	22
Sb	CPP-67	1.42	6.9	4.8
Cyanide	CPP-67	0.29	0.52	NA
Sulfide	CPP-67	8.1	15.7	NA
2-Butanone	CPP-67	0.008	0.009[d]	NA
Acetone	CPP-67	0.0239	0.091	NA
Benzene	CPP-67	0.001	0.001[d]	NA
Butylbenzyl-phthalate	CPP-67	0.612	1.4	NA
Carbon disulfide	CPP-67	0.014	0.014	NA
Chlorobenzene	CPP-67	0.001	0.001[d]	NA
Di-n-butylphthalate	CPP-67	0.0892	0.13[d]	NA
Diethyl-phthalate	CPP-67	0.041	0.041	NA
Pentachloro-phenol	CPP-67	0.37	0.37[d]	NA

a. Taken from the Final Record of Decision, Idaho Nuclear Technology and Engineering Center (DOE-ID 1999).

b. The INL background concentrations represent the 95% upper confidence limit (Rood et al. 1996).

c. NA = Not available.

d. The analyte was identified in the sample but the numerical result may not be accurate.

Table 2-2. Worker health-based radiological contaminants of concern.

Radionuclide	Matrix or Source	Average Activity Detected (pCi/g)[a]	Maximum Level Detected (pCi/g)	On-Site Background (pCi/g)[b]
Sr-90	CPP-03	30.0	43.9	0.49
	CPP-34	813	6000	NA[c]
	CPP-37A	0.37	0.69	NA
	CPP-37B	0.93	4.31	NA
Am-241	CPP-67	NA	NA	NA
	CPP-37A	0.476	0.99	0.01
	CPP-37B	1.18	3.89	NA
	CPP-67	0.631	7.8	NA
Np-237	CPP-67	NA	NA	NA
	CPP-03	NA	NA	NA
	CPP-34	0.7	0.7	NA
	CPP-37A	0.662	1.07	NA
	CPP-37B	0.513	0.86	NA
	CPP-67	1.12	1.63	NA
Pu-238	CPP-67	NA	NA	NA
	CPP-03	NA	NA	NA
	CPP-34	5.1	5.1	0.0049
	CPP-37A	0.11	0.12	NA
	CPP-37B	0.199	0.5	NA
	CPP-67	6.1	30.4	NA
Pu-239	CPP-67	0.549	2.07	0.1
U-234	CPP-67	NA	NA	NA
	CPP-03	NA	NA	NA
	CPP-34	1.47	2.5	1.44
U-238	CPP-67	NA	NA	NA
	CPP-03	NA	NA	NA
	CPP-34	1.71	2.8	1.4
	CPP-37A	0.727	3.99	NA
	CPP-37B	0.787	7.44	NA

Table 2-2. (continued).

Radionuclide	Matrix or Source	Average Activity Detected (pCi/g)[a]	Maximum Level Detected (pCi/g)	On-Site Background (pCi/g)[b]
Cs-137	CPP-03	18.9	65.1	0.82
	CPP-34	396	2000	NA
	CPP-37A	1.13	3.82	NA
	CPP-37B	2.04	6.31	NA
	CPP-67	40.6	180	NA
Eu-152	CPP-03	NA	NA	NA
Co-60	CPP-37A	0.5	0.5	NA
	CPP-67	0.599	2.35	NA
U-235	CPP-37A	0.05	0.05	NA
	CPP-37B	0.0575	0.07	NA
I-129	CPP-37B	1.57	1.57	NA
	CPP-67	2.5	3.7	NA
Ce-144	CPP-67	0.923	1.5	NA
Cs-134	CPP-67	1.5	3.5	NA
Eu-154	CPP-67	1.63	4	NA
H-3	CPP-67	0.61	0.61[d]	NA
Ru-106	CPP-67	3.45	5.97	NA

a. Taken from the Final Record of Decision, Idaho Nuclear Technology and Engineering Center (DOE-ID 1999).

b. The INL background concentrations represent the 95% upper confidence limit (Rood et al. 1996).

c. NA = Not available.

d. The analyte was identified in the sample but the numerical result may not be accurate.

Table 2-3. Exposure evaluation of dominant radioisotopes at the OU 3-13, Group 3, sites.

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
Silver CAS: 7440-22-4	OSHA PEL 0.01mg/m^3 ACGIH TLV 0.1 mg/m^3	Inhalation, ingestion, skin contact	Acute: Eye and skin irritation, possible contact dermatitis. Irritating to mucous membranes and upper respiratory tract. Extremely high exposures cause lung damage with pulmonary edema. Chronic: Argyria is a condition arising from the accumulation of silver in the body and is characterized by an unsightly, widespread blue-grey discoloration of the skin that can persist for long periods of time. The skin of exposed workers may also become black and have a metallic luster. Argyria may manifest in the conjunctiva of the eye, which may be affected sufficiently to cause lens and visual disturbances.	Skin, eyes, respiratory tract	No	Source in waste and in surface soils
Methylene Chloride CAS: 75-09-2 Vapor Density 2.9	OSHA PEL 25 ppm STEL 125 ppm ACGIH TLV 50 ppm	Inhalation, ingestion, skin contact	Acute: Mental confusion, light-headedness, fatigue, nausea, vomiting Chronic: Headache, depression, liver effects, kidney effects, bronchitis, loss of appetite, nausea, visual disturbances.	Kidneys, liver respiratory/ cardiovascular systems	No	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
Lead CAS: 7439-92-1	OSHA PEL 0.05 mg/m^3 ACGIH TLV 0.05 mg/m^3	Inhalation, ingestion, skin contact	Acute: Irritating to eyes, skin, respiratory system; muscle weakness. Repeated or prolonged skin contact may result in sensitization (dermatitis). Chronic: Brain and kidney damage, impaired hearing, vomiting, appetite loss, behavioral problems, increased blood pressure, digestive problems, nerve disorders, reproductive effects.	Eyes, skin, respiratory system, CNS, gastrointestinal, kidneys, blood, neurological, reproductive system	Yes IARC	Source in waste and in surface soils
Mercury CAS: 7439-97-6 Vapor Density 7.0	OSHA PEL 0.1 mg/m^3 ACGIH TLV 0.025 mg/m^3	Inhalation, ingestion, skin contact	Acute: Burns to eyes, skin, and respiratory tract. Sore throat, coughing, pain, tightness in chest, breathing difficulties, shortness of breath, headache, muscle weakness, anorexia, gastrointestinal disturbance, ringing in the ear, liver changes, fever, bronchitis and pneumonitis, CNS disturbances, gingivitis, memory loss, diarrhea, nephritis, anxiety, headache, weight loss, insomnia. Chronic: Gum/Mouth inflammation, CNS damage, muscle tremors, personality and behavior changes, memory loss, metallic taste, loosening of the teeth, digestive disorders, skin rashes, brain damage and kidney damage. Can cause skin	Eyes, skin, CNS, respiratory system, gastrointestinal system, gums, neurological, kidneys	No	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
			allergies and accumulate in the body. A suspected reproductive hazard, may damage the developing fetus and decrease fertility in males and females.			
Bis (2-ethylhexyl) phthalate CAS: 117-81-7 Vapor Density 13.5	OSHA PEL 5 mg/m^3 STEL 10 mg/m^3 ACGIH TLV 5 mg/m^3 STEL 10 mg/m^3	Inhalation, skin contact	Acute: Mild eye and skin irritation, including stinging, tearing and redness of eyes, and redness and burning of skin. Cough. Sore throat, abdominal cramps, diarrhea, nausea. Chronic: Effects include a slow-down in muscle coordination, mood swings, erratic behavior, loss of memory, loss of sensation/feeling, and nerve conductive loss.	Eyes, skin, respiratory system, gastrointestinal	Yes IARC, NTP	Source in waste and in surface soils
Selenium CAS: 7782-49-2	OSHA PEL 0.2 mg/m^3 ACGIH TLV 0.2 mg/m^3	Inhalation, ingestion, skin contact	Acute: Irritated upper respiratory tract, shortness of breath, bronchi spasms, pulmonary edema, headache, fever, chills, stomach problems, skin burns/rash, eye irritation. Chronic: Respiratory tract and gastrointestinal tract effects. Dermatitis, nausea, vomiting, cough, yellowish skin discoloration, loss of nails, garlic breath, and bad teeth.	Skin, eyes, kidney, liver, lungs, gastrointestinal tract	No	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
Arsenic CAS: 7440-38-2	OSHA PEL mg/m^3 ACGIH TLV 1.0 mg/m^3	Inhalation, ingestion, skin contact	Acute: Inflammation of mucous membranes, cough, foamy sputum, dyspnea, cyanosis, vomiting, bloody diarrhea, low blood pressure, cramps, convulsions, coma, skin irritation, redness, itching, or pain. Itching, burning, watering eyes Chronic: Bronzing of the skin, edema, dermatitis, and lesions. Hair/weight loss, garlic odor to breath/perspiration, excessive salivation and perspiration, hepatitis, gastrointestinal disturbances.	Cardiovascular system, CNS, skin	No	Source in waste and in surface soils
Toluene CAS: 108-88-3 Vapor Density 3.20	OSHA PEL 200 ppm ACGIH TLV 50 ppm	Inhalation, ingestion, skin contact	Acute: Headache, dizziness, anesthesia, drowsiness, unconsciousness, brain damage, eye and respiratory tract irritation. Chronic: Prolonged/repeated skin contact may result in dermatitis. May also cause liver, kidney, and brain damage.	Eyes, skin, respiratory tract, CNS, liver, kidney	No	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
Trichloroethane CAS: 71-55-6 Vapor Density 4.54	OSHA PEL 350 ppm ACGIH TLV 350 ppm	Inhalation, ingestion, skin contact	Acute: Mild hepatic effects, and CNS depression. Cardiac arrhythmia and respiratory arrest may result from the depression of the CNS. Other symptoms include dizziness, nausea, vomiting, diarrhea, unconsciousness, decreased blood pressure, irritation of the gastrointestinal tract, reddened, rough, and dry skin, cough, loss of sense and balance, visual disturbances, loss of appetite Chronic: May damage liver and cardiovascular system.	CNS, eyes, skin, liver, gastrointestinal tract, cardiovascular system	No	Source in waste and in surface soils
Barium CAS: 7440-39-3	OSHA PEL 10 mg/m^3 ACGIH TLV 0.5 mg/m^3	Inhalation, ingestion, skin contact	Acute: Eye, skin, nose, mouth, throat, and upper respiratory tract irritation. May cause severe gastroenteritis, including abdominal pain, vomiting and diarrhea, tremors, faintness, paralysis of the arms and legs, and slow or irregular heartbeat. Severe cases may produce collapse and death due to respiratory failure. Soluble barium compounds are more likely to cause these effects than insoluble compounds. Inhalation of fumes may cause sore throat, coughing, labored breathing, and irritation of the respiratory tract as well as the above symptoms.	Respiratory system, eye, skin, immune system (allergic reactions), central nervous system, and heart	No	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
			Chronic: Prolonged contact with eyes and skin may result in severe irritation or burns.			
Cadmium CAS: 7440-43-9 Vapor Density 3.9	OSHA PEL 0.2 mg/m3 (dust) ACGIH TLV 0.01 mg/m3 (dust)	Inhalation, ingestion	Acute: Mucous membrane irritation, dry mouth/throat, headache, nausea, dizziness. High inhalation exposure to oxide fume can cause respiratory irritation, pneumonitis and metal fume fever. Such exposure may be fatal. High ingestion exposure of soluble cadmium salts causes acute gastroenteritis. Chronic: Lung injury, kidney disease. Further effects include obstructive lung disease (probably lung cancer), kidney dysfunction or incipient kidney failure, kidney stones, skeletal collapse due to interference with the metabolism of calcium. Other effects reported are hypertension, reduced life span, prostate cancer, suppression of testicular function, and disruption of a number of enzyme systems.	Respiratory system, kidneys, blood, prostate	Yes IARC	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
Chromium CAS: 7440-47-3	OSHA PEL 0.5 mg/m^3 ACGIH TLV 0.05 mg/m^3	Inhalation, ingestion	Acute: Red, dry throat, gastrointestinal disorders, irritation of eyes and skin. Chronic: Repeated or prolonged contact may cause skin sensitization. Histologic fibrosis of lungs, nasal and/or lung cancer.	Respiratory system	Yes IARC	Source in waste and in surface soils
Kepone CAS: 143-50-0	Not established	Inhalation, ingestion, skin contact	Acute: Headache, anxiety, tremor, liver damage, kidney damage, visual disturbance, ataxia, chest pain, skin erythema (skin redness). Chronic: Testicular atrophy, low sperm count, cancer.	Eyes, skin, respiratory system, CNS, liver, kidneys, reproductive system	Yes IARC NTP	Source in waste and in surface soils
Acenaphthene CAS: 83-32-9	Not established, however, OSHA and ACGIH recommended PEL/TLV 0.2 mg/m^3 as coal tar pitch volatile (benzene soluble fraction)	Inhalation, ingestion, skin contact	Acute: Eyes, skin, digestive and respiratory tract irritation. Chronic: May cause lung irritation, bronchitis with cough and phlegm, and shortness of breath. May affect the liver and kidneys.	Eyes, skin, liver, kidneys	No	Source in waste and in surface soils
Fluorene CAS: 86-73-7	Not established	Inhalation, ingestion	Acute: Skin, eye, and respiratory irritant. Chronic: None known	Eyes, skin, respiratory tract	No	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
Pyrene CAS: 50-32-8 Vapor Density 8.7	OSHA PEL 0.2 mg/m^3 as coal tar pitch volatile (benzene soluble fraction) ACGIH TLV 0.2 mg/m^3 as coal tar pitch volatile (benzene soluble fraction)	Inhalation, ingestion, skin contact	Acute: Eye, skin, upper respiratory tract irritation. Chronic: May cause bladder, skin and lung cancer. May damage the developing fetus. May cause reproductive damage. May cause changes to the color and properties of skin. Exposure to sunlight can increase the skin damage caused by this chemical.	Liver, kidneys blood, skin	Yes IARC	Source in waste and in surface soils
Benzo (a) Anthracene CAS: 56-55-3	Not established	Inhalation, ingestion, skin contact	Acute: No human exposure information available. Chronic: No human exposure information available.	No human exposure information available	Yes IARC	Source in waste and in surface soils
Phenanthrene CAS: 85-01-8	OSHA PEL 0.2 mg/m^3 as coal tar pitch volatile (benzene soluble fraction) ACGIH TLV 0.2 mg/m^3 as coal tar pitch volatile (benzene soluble fraction)	Inhalation, ingestion, skin contact	Acute: Rash or burn with blisters on skin, nose and throat irritation, photosensitivity Chronic: Skin allergy with itching and rashes.	Eyes, skin	No	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
Anthracene CAS: 120-12-7	OSHA PEL 0.2 mg/m^3 as coal tar pitch volatile (benzene soluble fraction) ACGIH TLV 0.2 mg/m^3 as coal tar pitch volatile (benzene soluble fraction)	Inhalation, skin contact	Acute: Itching/burning skin; irritated nose, throat, and lungs; burns and irritates eyes, Chronic: Skin allergy. Repeated contact may cause thickening of skin, yellow-brown patchy areas, loss of skin pigment.	Skin	No	Source in waste and in surface soils
Fluoranthene CAS: 206-44-0	Not established	Inhalation, ingestion, skin contact	Acute: Eye irritation Chronic: No human exposure information available.	Eyes	No	Source in waste and in surface soils
Chrysene CAS: 218-01-9	OSHA PEL 0.2 mg/m^3 as coal tar pitch volatile (benzene soluble fraction) ACGIH TLV 0.2 mg/m^3 as coal tar pitch volatile (benzene soluble fraction)	Inhalation, ingestion, skin contact	Acute: Skin irritation. Chronic: No human exposure information available.	Skin	No	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
Aroclor 1254 PCB CAS: 11097-69-1	OSHA PEL 0.5 mg/m^3 ACGIH TLV 0.5 mg/m^3	Inhalation, ingestion, skin contact	Acute: Dry red skin, red painful eyes, headache, numbness, fever. Chronic: Respiratory tract symptoms, such as cough and tightness of the chest. Gastrointestinal effects including anorexia, weight loss, nausea, vomiting, and abdominal pain. Mild liver effects and effects on the skin and eyes, such as chloracne, skin rashes, and eye irritation. PCB ingestion associated with cardiovascular effects, including hypertension, mild liver effects, and effects on the skin such as pigmentation and acne. Cancer.	Eyes, skin, CNS, liver	Yes IARC	Source in waste and in surface soils
Aroclor 1260 PCB CAS: 11096-82-5	OSHA PEL 0.5 mg/m^3 ACGIH TLV 0.5 mg/m^3	Inhalation, ingestion, skin contact	Acute: Dry, red skin, red painful eyes, headache, numbness, fever Chronic: Respiratory tract symptoms, such as cough and tightness of the chest. Gastrointestinal effects including anorexia, weight loss, nausea, vomiting, and abdominal pain. Mild liver effects and effects on the skin and eyes, such as chloracne, skin rashes, and eye irritation.	Eyes, skin, CNS, liver	Yes IARC	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
			PCB ingestion associated with cardiovascular effects, including hypertension, mild liver effects, and effects on the skin such as pigmentation and acne. Cancer.			
Copper CAS: 7440-50-8	OSHA PEL 1 mg/m^3 (dust) ACGIH TLV	Inhalation, ingestion	Acute: Sneezing, coughing, nausea, vomiting, dizziness, gastrointestinal disturbances, skin and eye irritation, headaches. Chronic: Dermatitis.	Eyes, skin, gastrointestinal	No	Source in waste and in surface soils
Tin CAS: 7440-31-5	OSHA PEL 2 mg/m^3 (inorganic) ACGIH TLV 2 mg/m^3	Inhalation, ingestion	Acute: Metallic taste, respiratory tract, nose/throat irritation, coughing. Headache, dizziness, difficulty breathing. Nausea, vomiting, cramps, diarrhea. Skin-redness, burning, rash, dryness. Eye-redness, burning, tearing, blurred vision. Chronic: No human exposure information available.	Skin	No	Source in waste and in surface soils
Cyanide CAS: 74-90-8 Vapor Density 0.94	OSHA PEL 5 mg/m^3 ACGIH TLV 5 mg/m^3	Inhalation, ingestion, skin contact	Acute: Bleeding, weakness, headache, confusion, vertigo, fatigue, anxiety, dyspnea, and, occasionally, nausea and vomiting. Respiratory distress, coma and convulsions may occur.	Eyes, upper respiratory tract, gastrointestinal, thyroid	No	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
			If large amounts are absorbed, collapse is usually instantaneous; unconsciousness, often with convulsions, is followed soon by death. Chronic: Exposure at concentrations from 4 to 12 ppm for 7 years showed an increase in headaches, vertigo, weakness, changes in taste and smell, irritation of the throat, vomiting, effort dyspnea, lacrimation, abdominal colic, precordial pain, and nervous instability. Dermatitis, itching, scarlet rash, papules, and severe nose irritation. Thyroid changes, including frank goiter. Only occasionally has reference been made to eye irritation, conjunctivitis, or superficial keratitis developing.			
Sulfide CAS: 7783-06-4 Vapor Density 1.21	OSHA PEL 20 ppm ceiling ACGIH TLV 10 ppm STEL 15 ppm	Inhalation, ingestion, skin contact	Acute: Eye, mucous membrane, and skin irritation. Headache, nausea dizziness, coma, unconsciousness, pulmonary paralysis, sudden collapse, death. Chronic: Repeated exposure at low concentrations may cause conjunctivitis, photo phobia, corneal bullea, tearing, pain, blurred vision.	Eyes, respiratory system	No	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
2-Butanone (MEK) CAS: 78-93-3 Vapor Density 2.5	OSHA PEL 200 ppm ACGIH TLV 200 ppm STEL 300 ppm	Inhalation, ingestion, skin contact	Acute: Headaches, vomiting, nausea, weakness, dizziness. Eye, nose, throat irritation. Difficult breathing, CNS depression, respiratory failure. Chronic: Corneal injury, dermatitis, chemical pneumonitis and pulmonary edema	CNS, respiratory system	No	Source in waste and in surface soils
Acetone CAS: 67-64-1 Vapor Density 2.0	OSHA PEL 750 ppm STEL 1000 ppm ACGIH TLV 500 ppm STEL 750 ppm	Inhalation, ingestion, skin contact	Acute: Restlessness, slow reaction time, slurred speech, nausea, vomiting, dizziness, ataxia, intoxication, sensory disturbances, rapid pulse, sweating, drowsiness, stupor, coma. Chronic: Severe irritation or dermatitis. Prolonged exposure to the vapor irritates the skin. Repeated and prolonged contact of the liquid with skin can cause dryness and erythema (inflammation). Corneal injury may occur.	CNS, liver, kidneys	No	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
Benzene CAS: 71-43-2 Vapor Density 2.7	OSHA PEL 1 ppm 5 ppm ceiling ACGIH TLV 0.5 ppm STEL 2.5 ppm	Inhalation, ingestion	Acute: Drowsiness, dizziness, headache, nausea, loss of coordination, confusion and unconsciousness. Vomiting, delirium, convulsions, respiratory paralysis, death. Skin, eye, upper respiratory tract irritation. Chronic: Redness, dryness, cracking (dermatitis) due to the defatting action; pancytopenia may be followed by aplastic anemia or leukemia. Additional symptoms included an increased incidence of headaches, fatigue, difficulty sleeping and memory loss among workers with significant exposures.	Blood and blood-forming organs, immune system, CNS, respiratory system	Yes IARC NTP ACGIH-A1	Source in waste and in surface soils
Butyl benzyl-phthalate CAS: 85-68-7	Not established	Inhalation	Acute: Irritates the eyes, the skin, and the respiratory tract. Chronic: May have effects on the liver and kidneys resulting in impaired functions.	Liver, kidneys	No	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
Carbon Disulfide CAS: 75-15-0 Vapor Density 2.67	OSHA PEL 20 ppm 30 ppm ceiling ACGIH TLV 4 ppm STEL 12 ppm Ceiling 30 ppm	Inhalation, ingestion, skin contact	Acute: Severe skin, eye, and respiratory irritant. May cause headache, dizziness, fatigue, muscle weakness, numbness, nervousness, or psychological disturbances. Chronic: Liver, kidney, CNS damage, and impaired vision. Can cause increased atherosclerosis, leading to risk of cardiovascular disease. Prolonged exposure of female workers to low concentrations of carbon disulfide has been associated with birth defects in offspring.	Liver, kidney, CNS, eyes	No	Source in waste and in surface soils
Chlorobenzene CAS: 108-90-7 Vapor Density 3.88	OSHA PEL 75 ppm ACGIH TLV 10 ppm	Inhalation, ingestion	Acute: Severe skin, eye, and respiratory irritation, headaches, CNS damage, corneal damage, vomiting. Chronic: Dermatitis, skin burns, kidney, lung and liver damage. CNS effects include numbness, cyanosis, hyperesthesia (increased sensation), and muscle spasms. Headaches and irritation of the mucosa of the upper respiratory tract and eyes.	Liver, kidneys, CNS, lungs	No	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
Di-n-butylphthalate CAS: 84-74-2 Vapor Density 9.6	OSHA PEL 5 mg/m^3 ACGIH TLV 5 mg/m^3	Inhalation, ingestion, skin contact	Acute: Irritates eyes, skin, respiratory tract. Symptoms may include nausea, vomiting, and diarrhea. Chronic: CNS effects include pain, numbness, weakness and spasms in the extremities.	Eyes, skin, respiratory tract, CNS	No	Source in waste and in surface soils
Diethyl-phthalate CAS: 84-66-2 Vapor Density 7.66	OSHA PEL Not established ACGIH TLV 5 mg/m^3	Inhalation, ingestion	Acute: Coughing, chest pain, and shortness of breath. Higher exposures may cause central nervous system effects. Gastrointestinal tract irritation. Eye irritation, with redness and pain. Chronic: No information found.	Eyes, respiratory system, gastrointestinal, CNS	No	Source in waste and in surface soils
Pentachloro-phenol CAS: 87-86-5 Vapor Density 9.2	OSHA PEL 0.5mg/m^3 ACGIH TLV 0.5mg/m^3	Inhalation, ingestion, skin contact	Acute: Cough. dizziness, drowsiness, headache. Fever or elevated body temperature. Labored breathing, sore throat. Irritates skin (redness and/or blisters). Irritates eyes (redness and pain). Abdominal cramps, diarrhea. nausea, unconsciousness, vomiting, weakness. Damage to liver and kidneys.	Eyes, skin, respiratory tract, cardiovascular, gastrointestinal, liver, kidney, CNS	Yes IARC	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
			Chronic: mutates living cells, may damage a developing fetus. Repeated exposures may damage liver, kidneys, blood, and nervous system. Bronchitis, skin rash, weight loss, weakness, excessive sweating. Possible cancer.			
Radionuclides—Cs-137, Sr-90, and Pu-238 (dominant radioisotopes, OU 3-13, Group 3, Other Surface Soils, remediation project)						
Radionuclides (whole-body exposure)	As stated in limiting condition section of radiological work permit.	Inhalation, ingestion, and injection. Note α and β particles pose a skin contact hazard.	Acute: Bone Marrow Syndrome (dose, 0.7 – 10 Gy): anorexia, nausea, vomiting followed by bone marrow cells dying, though patient may appear/feel well, then a drop in blood cell counts for several weeks with anorexia, fever, malaise. Death from infection and hemorrhage. Gastrointestinal Syndrome (dose, 10–100 Gy): anorexia, severe nausea, vomiting, cramps, diarrhea followed by bone marrow and GI tract cells dying, though patient may appear/feel well. Then malaise, anorexia, severe diarrhea, fever, dehydration, electrolyte imbalance. Death from infection, dehydration, and electrolyte imbalance.	Blood forming cells, gastrointestinal tract, and rapidly dividing cells	Yes IARC	Source in waste and in surface soils

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site
			Cardiovascular/CNS Syndrome (dose, >50 gy) extreme nervousness; confusion; severe nausea, vomiting, watery diarrhea; loss of consciousness; burning sensations of the skin then patient may gain partial functionality followed by more watery diarrhea, convulsions, coma and death. Cutaneous Radiation Syndrome (<0.7 Gy): damaged basal cell layer of skin inflammation, erythema, and dry or moist desquamation. Hair follicles may be damaged causing epilation. May be followed by transient and inconsistent erythema (with itching). Then, may be a latent phase followed by intense reddening, blistering, and ulceration of the irradiated skin. Very large skin doses can cause permanent hair loss, damaged sebaceous/sweat glands, atrophy, fibrosis, decreased or increased skin pigmentation, and ulceration or necrosis of the exposed tissue. Chronic: Possible cancer.			

Table 2-3. (continued).

Material or Chemical (CAS No., Vapor Density, and Ionization Energy)	Exposure Limit[a] (Permissible Exposure Limit and Threshold Limit Value)	Routes of Exposure	Symptoms of Overexposure[b] (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[c]	Matrix or Source at Project Site

a. Sources: *Threshold Limit Values Booklet* (ACGIH 2003) and substance-specific standards (29 CFR 1910).

b. These include (1) nervous system: dizziness, nausea, and lightheadedness; (2) dermis: rashes, itching, and redness; (3) respiratory system: respiratory effects; and (4) eyes: tearing and irritation.

c. If yes, identify agency and appropriate designation (i.e., ACGIH A1 or A2; National Institute of Occupational Safety and Health (OSHA); Occupational Safety and Health Administration (NIOSH); International Agency for Research on Cancer (IARC); National Toxicology Program (NTP).

PEL = permissible exposure limit.
TLV = threshold limit value.
STEL = short-term exposure limit.
CNS = central nervous system.
PCB = polychlorinated biphenyl.

Table 2-4. Summary of OU 3-13, Group 3, Other Surface Soils, remediation activities, associated hazards, and mitigation.

Activity or Task	Associated Hazards or Hazardous Agent	Hazard Mitigation
Mobilization and site preparation (Heavy equipment, motor vehicles, support equipment, site clearing, utility surveys, and establish zones and staging areas)	Radiological contamination—subsurface soils. Radiation exposure— subsurface soils.	Radiological control technician surveys, radiological work permit (RWP) as required, dosimetry, direct-reading instruments, and compliance with posted entry and exit requirements to project areas.
	Nonionizing radiation—Solar UV.	Train workers.
	Noise—multiple running engines, backup alarms.	Industrial hygienist (IH) monitoring and use hearing protective devices as required.
	Chemical and inorganic contaminants—subsurface soil, marking paint, diesel fuel, hydraulic fluid, and oil.	Controlled areas, qualified operators, job safety analyses (JSAs), safe work permits (SWPs), TPRs, or work packages. Material safety data sheets for chemicals onsite, IH monitoring, and PPE.
	Equipment movement and vehicle traffic—trailers, pinch points, ergonomic concerns, and struck-by or caught-between potential.	Train workers, JSAs, SWPs, TPRs, qualified heavy equipment operators, designated traffic lanes and areas, watch body position, and wear PPE.
	Lifting and back strain—moving and staging materials.	Mechanical equipment movement, proper lifting techniques, and two-person lifts. Subcontractor may use the "whichever is less: 50 lb or 1/3 your body weight" rule.
	Heat and cold stress.	IH monitoring and work-rest cycles as required. Cool drinking water available.
	Tripping hazards and working-walking surfaces—existing installations in ground, uneven surfaces, rocks, ice- and snow-covered surfaces, and wet equipment decks and ladders.	Awareness of installation locations, surface conditions, and salt and sand icy areas. Use nonskid or high-fiction footwear on walking surfaces.
	Stored energy sources and subsurface interferences—electrical, water and gas lines, elevated materials, hoisting and rigging, gas cylinders.	Identify and mark all utilities and subsurface structures, identify at-risk surface encumbrances, ensure all lines and cords are checked for damage and continuity, use ground-fault circuit interrupter (GFCI) on outdoor equipment, and comply with minimum clearances for overhead lines. Secure cylinders, caps, and bottles before movement.

Table 2-4. (continued).

Activity or Task	Associated Hazards or Hazardous Agent	Hazard Mitigation
Excavation of contaminated soils or removal of boxed contaminated materials	Radiological contamination—subsurface soils. Radiation exposure—near waste shipments.	Radiological control technician surveys, air monitoring, RWP as required, dosimetry, direct reading instruments, comply with posted entry and exit requirements to project areas.
	Nonionizing radiation—solar UV.	Train workers.
	Noise—multiple running engines, backup alarms.	IH monitoring and use hearing protective devices as required.
	Chemical or inorganic contaminants—subsurface soils, marking paint, diesel fuel, hydraulic fluid, and oil.	Controlled areas, qualified operators, JSAs, SWP, TPRs or work package. Material safety data sheets for chemicals onsite, industrial hygienist monitoring, and PPE.
	Equipment movement and vehicle traffic—pinch points and struck-by and caught-between potential.	Train workers, JSAs, SWPs, TPRs, qualified heavy equipment operators, designated traffic lanes and areas, watch body position, wear PPE.
	Engulfment due to cave-in, hazardous atmosphere potential, fall hazard, and objects falling into excavation.	Competent person on site. Keep excavated materials, tools, supplies, etc. 2 ft back from edge of excavation. Use retaining devices for supplies, etc. staged within 2 ft of excavation. Inspect excavation prior to entry and after any hazard-increasing event. Proper means of access/egress. Proper surface encumbrance support. Erect barricades or barriers or use other means to prevent falls into excavations.
	Lifting and back strain—staging materials and lifting carts.	Proper lifting techniques, two-person lifts (as required). Subcontractor may use the “whichever is less: 50 lb or 1/3 your body weight” rule.
	Heat and cold stress.	IH monitoring and work-rest cycles (as required).
	Tripping hazards and working-walking surfaces—existing installations in ground, uneven surfaces, rocks, ice- and snow-covered surfaces, and wet equipment decks and ladders.	Awareness of installation locations, surface conditions, salt and sand icy areas. Use nonskid or high-friction footwear on walking surfaces.

Table 2-4. (continued).

Activity or Task	Associated Hazards or Hazardous Agent	Hazard Mitigation
Loading contaminated soils or materials onto transport.	Radiological contaminants—subsurface soils.	Radiological control technician surveys, dosimetry, continuous air monitoring and periodic grab samples, and hold points as specified in the RWP.
	Radiation exposure—subsurface soils.	
	Nonionizing radiation—solar UV.	Train workers.
	Noise—multiple running engines, backup alarms.	IH monitoring and use hearing protective devices as required.
	Chemical and inorganic contaminants—subsurface soil and waste, marking paint, diesel fuel, hydraulic fluid, and oil.	Material safety data sheets for chemicals onsite, industrial hygienist monitoring, and PPE.
	Equipment movement and vehicle traffic—forklift, crane, pinch points, ergonomic concerns, and struck-by or caught-between potential.	Controlled work areas, qualified operators, JSAs, SWPs, TPRs or work package, proper body position, pre-use and periodic inspections, and PPE.
	Hoisting and rigging.	Trained and qualified riggers. Pre-use and periodic inspections.
	Lifting and back strain—staging and lifting materials.	Proper lifting techniques, two- or three-person lifts (probe casing). Subcontractor may use the "whichever is less: 50 lb or 1/3 your body weight" rule.
	Heat and cold stress.	IH monitoring, work-rest cycles (as required)
	Tripping hazards and working-walking surfaces—existing installations in ground, uneven surfaces, rocks, ice- and snow-covered surfaces, and wet equipment decks and ladders.	Awareness of installation locations, surface conditions, salt and sand icy areas, and use nonskid or high-fiction materials on walking surfaces. Use nonskid or high-fiction footwear on walking surfaces.
Backfilling excavated areas	Equipment movement and vehicle traffic—pinch points and struck-by and caught-between potential.	Train workers, JSAs, SWPs, TPRs, qualified heavy equipment operators, designated traffic lanes and areas, watch body position, wear PPE.
	Nonionizing radiation—solar UV.	Train workers.
	Noise—multiple running engines, backup alarms.	IH monitoring and use hearing protective devices as required.
	Lifting and back strain—staging and lifting materials.	Proper lifting techniques, two-person lifts (as required). Subcontractor may use the "whichever is less: 50 lb or 1/3 your body weight" rule.
	Heat and cold stress.	IH monitoring and work-rest cycles (as required).

Table 2-4. (continued).

Activity or Task	Associated Hazards or Hazardous Agent	Hazard Mitigation
	Tripping hazards and working-walking surfaces—existing installations in ground, uneven surfaces, rocks, ice- and snow-covered surfaces, and wet equipment decks and ladders.	Awareness of installation locations, surface conditions, and salt and sand icy areas. Use nonskid or high-fiction footwear on walking surfaces.
Demobilization	Radiological contaminants—decontamination of tools and equipment. Radiation exposure—decontamination of tools and equipment.	Radiological control technician surveys, dosimetry, air monitors, hold points.
	Equipment movement and vehicle traffic—pinch points and struck-by and caught-between potential.	Train workers, JSAs, SWPs, TPRs, qualified heavy equipment operators, designated traffic lanes and areas, watch body position, wear PPE.
	Nonionizing radiation—solar UV.	Train workers.
	Noise—multiple running engines, backup alarms.	IH monitoring and use hearing protective devices as required.
	Lifting and back strain—staging and lifting materials.	Proper lifting techniques, two-person lifts (as required).
	Heat and cold stress.	IH monitoring and work-rest cycles (as required).
	Tripping hazards and working-walking surfaces—existing installations in ground, uneven surfaces, rocks, ice- and snow-covered surfaces, and wet equipment decks and ladders.	Awareness of installation locations, surface conditions, salt and sand icy areas. Use nonskid or high-friction footwear on walking surfaces.

2.1.1 Routes of Exposure

Exposure pathways exist for both chemicals and radionuclides at the project site. Engineering controls, monitoring, training, and work controls will mitigate potential contact and uptake of these hazards; however, the potential for exposure to contaminants still exists. Exposure pathways include those listed below:

- Inhalation of radiological and nonradiological contaminated soil or fugitive dusts during waste handling, disposal, or decontamination tasks. Inhalable or respirable (dependent on the particle size) fugitive dusts may have trace amounts of radiological or nonradiological contaminants associated with them, resulting in potential respiratory tract deposition.

- Skin absorption and contact with radiological and nonradiological contaminated soil or surfaces during waste handling, disposal, and decontamination tasks. Radiological and nonradiological contaminants can be absorbed through the skin, resulting in uptake through the skin and/or skin contamination.

- Ingestion of radiological and nonradiological contaminated soil or materials adsorbed to dust particles or waste residues, resulting in potential uptake of contaminants through the gastrointestinal (GI) tract that may result in GI irritation, internal tissue irradiation, and/or deposition to target organs.

- Injection of radiological and nonradiological contaminated materials by breaking of the skin or migration through an existing wound, resulting in localized irritation, contamination, uptake of soluble contaminants, and deposition of insoluble contaminants.

Chemical and radiological hazards will be eliminated, isolated, or mitigated to the extent possible during all project tasks. Where they cannot be eliminated or isolated, monitoring for chemical and radiological hazards will be conducted (as described in Section 3) to detect and quantify exposures. Additionally, administrative controls, training, work procedures, and protective equipment will be used to further reduce the likelihood of exposure to these hazards. Table 2-4 summarizes each primary project task, associated hazards, and mitigation procedures.

The primary hazard identification and mitigation document for OU 3-13, Group 3, Other Surface Soils, Remediation Phase I is the project/activity JSA. Safe work permits (SWPs) and radiological work permits (RWPs) may be used in conjunction with the JSA and this HASP to address specific hazardous operations (e.g., hot work) and radiological conditions at the project site. If used, these permits will further detail specialized PPE and dosimetry requirements.

2.1.2 Chemical Exposure Control

Control measures to prevent or minimize airborne solids are found in Table 3-2 of Section 3 below. It is anticipated that these control measures will be adequate to curtail particulate inhalation and accumulation on work surfaces.

Based on the reported concentrations in Table 2-1 (all below 1 part per million [ppm]) and outside work locations, exposures to the listed chemicals that produce volatile or semivolatile organic compounds (VOCs or SVOCs) are expected to be well below OSHA permissive exposure levels (PELs) or American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs) for the chemicals. Should sustained concentrations of VOCs be encountered, actions specified in Section 3, Table 3-2, below are to be taken.

Note: A sustained concentration is a 1-minute period monitored with an appropriate instrument such as a mini-RAE photo-ionization detector that results in a reading at or above the specified action level.

Further controls are discussed in Section 7 of this HASP.

2.1.3 Radiation Exposure Control

Radiation exposure limits are based on requirements contained in Subpart C of 10 CFR 835 and company policies and procedures. The limits, including administrative control limits, for OU 3-13, Group 3, Other Surface Soils, have been established and will be published in required RWPs. All radiation exposures will be maintained as low as reasonably achievable (ALARA) through selected suitable work controls such as, but not limited to, the following:

- Appropriate level of HAZWOPER and radiological worker training
- RWP, JSA, and other work control documentation
- Controlled and/or amended water sprays to control dust
- Postings
- Hold points
- Worker rotation
- Site access and exit controls.

The OU 3-13, Group 3 project sites will be managed to ensure that (1) acceptable short-term risk levels will be met for members of the community and nonradiation workers, and (2) OSHA and DOE dose limits will not be exceeded for radiation workers.

2.2 Biological, Environmental, and Physical Hazards and Mitigation

Biological, environmental, and physical hazards will be encountered while performing contaminated soils removal and related support tasks at the OU 3-13, Group 3, sites. Section 4.2 provides general safe-work practices that must be followed at all times. The following sections describe specific industrial safety hazards and procedures to be followed to eliminate or minimize potential hazards to project personnel.

The project subcontract technical representative will ensure the Subcontract health and safety officer is aware of and receives a copy of pertinent facility-specific administrative control procedures.

2.2.1 Material Handling and Back Strain

Material handling and maneuvering of various pieces of equipment may result in employee injury. All lifting and material-handling tasks will be performed in accordance with PRD-2016/MCP-2739, "Material Handling, Storage, and Disposal." Personnel will not physically lift objects weighing more than 22 kg (50 lb) or 33% of their body weight (whichever is less) alone. Additionally, back strain and

ergonomic considerations must be given to material handling and equipment usage. Mechanical and hydraulic lifting devices should be used to move materials whenever possible. The industrial hygienist will conduct ergonomic evaluations of various project tasks to determine the potential ergonomic hazards and provide recommendations to mitigate these hazards. Applicable requirements from PRD-2016 or MCP-2739, "Material Handling, Storage, and Disposal," also will be followed.

2.2.2 Repetitive Motion and Musculoskeletal Disorders

Long, continuous periods of shoveling, operating a hand compactor, and other repetitive tasks to be performed may expose personnel to repetitive-motion hazards, undue physical stress, overexertion, awkward postures, or other ergonomic risk factors that may lead to musculoskeletal disorders. Musculoskeletal disorders can cause a number of conditions including pain, numbness, tingling, stiff joints, difficulty moving, muscle loss, and sometimes paralysis. The assigned project industrial hygienist will evaluate project tasks and provide recommendations to reduce the potential for musculoskeletal disorders in accordance with PRD-2016/MCP-2739, "Material Handling, Storage, and Disposal."

2.2.3 Working and Walking Surfaces

Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, slips, and falls. The OU 3-13, Group 3 sites present inherent tripping hazards because of the nature of excavation work and naturally occurring environmental conditions. Additionally, the potential for slip, trip, and fall hazards will increase during winter months because of ice- and snow-covered surfaces combined with objects beneath the snow. During the prejob briefing, all personnel will be made aware of tripping hazards that cannot be eliminated. Tripping and slip hazards will be evaluated during the course of the project in accordance with PRD-2005 or PRD-5103, "Walking and Working Surfaces."

2.2.4 Elevated Work Areas

Personnel may sometimes be required to work on elevated equipment or at heights above 1.8 m (6 ft). During such work, employees will comply with requirements from PRD-2002 or PRD-5096, "Fall Protection," and applicable requirements from 29 CFR 1910.178, "Powered Industrial Trucks"; PRD-2003, "Ladders"; PRD-2004 or PRD-5098, "Scaffolding"; and PRD-2005 or PRD-5103. Where required, a fall protection plan will be written.

2.2.5 Powered Equipment and Tools

Powered equipment and tools present potential physical hazards (e.g., pinch points, electrical hazards, flying debris, struck-by, and caught-between) to personnel operating them. All portable equipment and tools will be properly maintained and used by qualified individuals and in accordance with the manufacturer's specifications. At no time will safety guards be removed. Requirements from PRD-2015, "Hand and Portable Power Tools," or PRD-5101, "Portable Equipment and Handheld Power Tools," will be followed for all work performed with powered equipment, including hand tools. All tools will be inspected by the user before use.

2.2.6 Electrical Hazards and Energized Systems

Electrical equipment and tools, as well as overhead and underground lines associated with OU 3-13, Group 3 operations, may pose shock or electrocution hazards to personnel. Safety-related work practices will be employed to prevent electric shock or other injuries resulting from direct or indirect electrical contact. If work on energized systems is necessary, these practices will conform to the requirements in PRD-2011 or PRD-5099, "Electrical Safety"; MCP-3650, "Chapter IX Level I Lockout

and Tagouts"; MCP-3651, "Chapter IX Level II Lockouts and Tagouts"; and Parts I through III of the National Fire Protection Act 70E. In addition, all electrical work will be reviewed and completed under the appropriate work controls (e.g., TPRs and work orders). When working around overhead lines, clearances will be maintained at all times. Additionally, all underground utilities and installations will be identified before conducting excavation activities in accordance with PRD-2014, "Excavation and Surface Penetrations."

2.2.7 Fire and Flammable Materials Hazards

Fuel will be required for equipment use during OU 3-13, Group 3 operations. Flammable hazards may include the transfer and storage of flammable or combustible liquids in the operations area. Portable fire extinguishers with a minimum rating of 10A/60BC will be strategically located at the project site to combat Class ABC fires. They will be located in all active operations areas, on or near all facility equipment that has exhaust heat sources, and on or near all equipment capable of generating ignition or having the potential to spark. Guidance from MCP-2707, "Compatible Chemical Storage," will be consulted when storing chemicals. Additionally, a fire hazards analysis may be prepared for the project in accordance with MCP-579, "Performing Fire Hazards Analysis."

2.2.7.1 Combustible Materials. Combustible or ignitable materials in contact with or near exhaust manifolds, catalytic converters, or other ignition sources could result in a fire. A fire protection engineer should be contacted if questions arise about potential ignition sources. The accumulation of combustible materials will be strictly controlled. Disposal of combustible materials will be assessed at the end of each shift. Class A combustibles such as trash, cardboard, rags, wood, and plastic will be properly disposed of in appropriate waste containers. The fire protection engineer also may conduct periodic site inspections to ensure all fire protection requirements are being met.

2.2.7.2 Flammable and Combustible Liquids. Fuel used at the site for fueling must be safely stored, handled, and used. Only flammable liquid containers approved by the Factory Mutual and Underwriters Laboratories and labeled with the contents will be used to store fuel. All fuel containers will be stored at least 15 m (50 ft) from any facilities and ignition sources or they will be stored inside an approved flammable storage cabinet. Additional requirements are provided in PRD-2201 or PRD-308. Portable motorized equipment (e.g., generators and light plants) will be shut off and allowed to cool down in accordance with the manufacturer's operating instructions before being refueled to minimize the potential for a fuel fire.

2.2.7.3 Welding, Cutting, or Grinding. Personnel conducting welding, cutting, or grinding tasks may be exposed to molten metal, slag, and flying debris. Additionally, a fire potential exists if combustible materials are not cleared from the work area. Requirements from PRD-2010 or PRD-5110 "Welding, Cutting, and Other Hot Work," will be followed whenever these types of activities are conducted.

2.2.8 Pressurized Systems

Pneumatic and hydraulic systems associated with heavy equipment and motor vehicles will be operated at the project site, as may gas welding and cutting torches, and portable pressure washers. The hazards presented to personnel, equipment, facilities or the environment because of inadequately designed or improperly operated pressure (or vacuum) systems include blast effects, shrapnel, fluid jets, release of toxic or asphyxiant materials, contamination, equipment damage, personnel injury, and death. These systems can include pneumatic, hydraulic, vacuum, or compressed gas systems. The requirements of PRD-2009, "Compressed Gases"; PRD-5, "Boilers and Unfired Pressure Vessels"; and the manufacturer's operating and maintenance instructions must be followed.

All pressure systems will be operated in the designed operating pressure range, which is typically 10 to 20% less than the maximum allowable working pressure. Additionally, all hoses, fittings, lines, gauges, and system components will be rated for the system for at least the maximum allowable working pressure (generally the relief set point). The project safety professional should be consulted about any questions regarding pressure systems in use at the project site.

2.2.9 Compressed Gases

Gas welding and cutting activities, and environmental sampling may be conducted at OU 3-13, Group 3 soil remediation sites. All cylinders will be used, stored, handled, and labeled in accordance with PRD-2009. Additionally, the safety professional should be consulted about any compressed gas cylinder storage, transport, and usage issues.

2.2.10 Heavy Equipment and Moving Machinery

Hazards associated with the operation of heavy equipment include injury to personnel (e.g., struck-by and caught-between hazards), and equipment and property damage. All heavy equipment will be operated in the manner in which it was intended and in accordance with manufacturer's instructions. Only authorized qualified personnel will be allowed to operate equipment and personnel near operating heavy equipment must maintain visual communication with the operator. Personnel will comply with PRD-2020 or MCP-2745, "Heavy Industrial Vehicles," and PRD-2019 or PRD-5123, "Motor Vehicle Safety."

Personnel working around or near cranes or boom trucks will also comply with PRD-600, "Site Maintenance Management Program," and MCP-1143, "Hoisting and Rigging INTEC Supplement to PRD-160," as applicable and appropriate.

Project personnel working around or near heavy equipment and other moving machinery will comply with the following CH2M WG Idaho, LLC (CWI) documents:

- MCP-6501, "Hoisting and Rigging Operations"
- MCP-6502, "Hoisting and Rigging Maintenance"
- MCP-6503, "Inspection and Testing of Hoisting and Rigging Equipment"
- MCP-6504, "Hoisting and Rigging Lift Determination and Lift Plan Preparation"
- MCP-6505, "Hoisting and Rigging Training"
- DOE-STD-1090-01, Chapter 15, Construction Hoisting and Rigging Equipment Requirements, Department of Energy (DOE).

Additional safe practices will include the following:

- All heavy equipment will have backup alarms.
- Walking directly behind or to the side of heavy equipment without the operator's knowledge is prohibited. All precautions will be taken before moving heavy equipment.

- While operating heavy equipment in the work area, the equipment operator will maintain communication with a designated person who will be responsible for providing direct voice contact or approved standard hand signals. In addition, all facility personnel in the immediate work area will be made aware of the equipment operations.

- All equipment will be kept out of traffic lanes and access ways and will be stored so as not to endanger personnel at any time.

- All unattended equipment will have appropriate reflectors or be barricaded if left on roadways.

- All parked equipment will have the parking brake set and chocks will be used when equipment is parked on inclines.

- The swing radius of heavy equipment will be adequately barricaded or marked to prevent personnel from entering into the swing radius.

- Pedestrian traffic on haul routes will be controlled by placing rope and signs. A designated crosswalk will be established for pedestrians. Pedestrians must yield the right-of-way to emergency vehicles and haul traffic. Pedestrians accessing the haul route must be briefed before using the designated crosswalk.

- Nonproject vehicular traffic will cross at designated intersections on the haul route. Only previously briefed drivers are allowed to cross. No private vehicles will be allowed to cross haul routes. All nonproject vehicular traffic shall yield the right-of-way to emergency vehicles and haul traffic.

2.2.11 Excavation, Surface Penetrations, and Outages

Excavation activities will be conducted to remove contaminated soils from OU 3-13, Group 3 sites. All surface penetrations and related outages will be coordinated through the INTEC construction coordinator and will require submittal of an outage request (i.e., Form 433.1, "Outage Request") for outages (e.g., road, electrical, and water). The submission of an outage request will not be considered an approval to start the work. Other specific outage requirements are addressed in the special conditions section of the management and operating contract. No surface penetrations will be allowed or conducted until the area has been evaluated and an approved subsurface evaluation has been documented (subsurface investigation).

All excavation activities will be conducted and monitored in accordance with PRD-2014, PRD-22, "Excavation and Surface Penetrations," and 29 CFR 1926, Subpart P, "Excavations." The following are some key elements from these requirements:

- The location of utility installations (e.g., sewer, telephone, fuel, electric, water lines, or any other underground installations) that may reasonably be expected to be encountered during excavation work will be determined before opening an excavation.

- Structural ramps that are used solely by employees as a means of access or egress from excavations will be designed by a competent person. Structural ramps used for access or egress of equipment will be designed by a competent person qualified in structural design and will be constructed in accordance with the design. Structural ramps will be inspected in accordance with Form 432.57, "Excavation Checklist."

- Employees exposed to public vehicular traffic will be provided with and will wear warning vests or other suitable garments marked with or made of reflecting or high-visibility material.

- Daily inspections of excavations, areas adjacent to the excavations, and protective systems will be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection will be conducted by the competent person before the start of work and as needed throughout the shift. Inspections also will be made after every rainstorm or other hazard-increasing occurrence.

- Sloping or benching will be constructed and maintained in accordance with the requirements set forth in 29 CFR 1926, Subpart B, Appendix B, for the soil type as classified by the competent person. This classification of the soil deposits will be made based on the results of at least one visual inspection and at least one manual analysis.

2.2.12 Hoisting and Rigging

All hoisting and rigging of the boxed waste (if necessary) will be performed in accordance with PRD-2007, "Hoisting and Rigging," or PRD-600, "Site Maintenance Management Program," and DOE-STD-1090-01 "Hoisting and Rigging," as applicable for OU 3-13, Group 3 operations. Hoisting and rigging equipment will show evidence of a current inspection (e.g., tag) and be inspected before use by qualified personnel. Additionally, the operator or designated person for mobile cranes or boom trucks will perform a visual inspection each day or before use (if the crane has not been in regular service) of items such as, but not limited to, the following:

- All control mechanisms for maladjustment that would interfere with proper operation

- Crane hooks and latches for deformation, cracks, and wear

- Hydraulic systems for proper oil level

- Lines, tanks, valves, pumps, and other parts of air or hydraulic systems for leakage

- Hoist ropes for kinking, crushing, birdcaging, and corrosion

- All anti-two-block, two-block warning, and two-block damage prevention systems for proper operation.

Note: The operator or other designated person will examine deficiencies and determine whether they constitute a safety hazard. If deficiencies are found, they will be reported to the safety professional.

2.2.13 Overhead Objects

Personnel may be exposed to falling overhead objects, debris, or equipment or impact hazards during waste loading operations. Sources for these hazards will be identified and mitigated in accordance with PRD-2005 or PRD-5103. In the case of overhead impact hazards, they will be marked by using engineering-controls protective systems where there is a potential for falling debris, in combination with head protection PPE.

2.2.14 Personal Protective Equipment

Wearing PPE may reduce a worker's ability to move freely, see clearly, and hear directions and noise that might indicate a hazard. In addition, PPE can increase the risk of heat stress. Work activities at the work site will be modified as necessary to ensure that personnel are able to work safely in the required PPE. Work-site personnel will comply with PRD-5121, "Personal Protective Equipment," and MCP-432, "Radiological Personal Protective Equipment." All personnel who wear PPE will be trained in its use and limitations in accordance with PRD-5121.

2.2.15 Decontamination

Decontamination procedures for personnel and equipment are detailed in Section 11. Potential hazards to personnel conducting decontamination tasks include back strain; slip, trip, and fall hazards; and cross-contamination from contaminated surfaces. Additionally, electrical hazards may be present if powered equipment (e.g., a powered pressure washer) is used. Mitigation of these walking-working surfaces and electrical hazards are addressed in other prior subsections. If a power washer or heated power washer is used, units will be operated in accordance with manufacturer's operating instructions, personnel will wear appropriate PPE to prevent high-pressure spray injuries, ground-fault circuit protection will be used, and these tasks will only be conducted in approved areas. Personnel will wear required PPE at all times during decontamination tasks as listed in Section 5.

2.3 Environmental Hazards and Mitigation

Environmental hazards present potential hazards to personnel during project tasks. These hazards will be identified and mitigated to the extent possible. This section describes these environmental hazards and states what procedures and work practices will be followed to mitigate them.

2.3.1 Noise

Personnel involved in project activities may be exposed to noise levels from the heavy equipment, motor vehicles, power tools, etc., that exceed 85 decibel A-weighted (dBA) for an 8-hour time-weighted average (TWA) or 83 dBA for 10-hour TWA. The effects of high sound levels (noise) may include the following:

- Personnel being startled, distracted, or fatigued
- Physical damage to the ear, and pain and temporary or permanent hearing loss
- Interference with communication that would warn of danger.

Where noise levels are suspected of exceeding 80 dBA, noise measurements will be performed in accordance with PRD-2108, "Hearing Conservation," or MCP-2719, "Controlling and Monitoring Exposure to Noise," to determine if personnel are routinely exposed to noise levels in excess of the applicable TWA (85 dBA for 8 hours of exposure or 83 dBA for 10-hour exposures).

Personnel whose noise exposure meets or exceeds the allowable TWA will be enrolled in the ICP Occupational Medical Program (OMP) (or subcontractor hearing conservation program as applicable). Personnel working on jobs that have noise exposures greater than 85 dBA (83 dBA for a 10-hour TWA) will be required to wear hearing protection until noise levels have been evaluated and will continue to wear the hearing protection specified by the industrial hygienist until directed otherwise. Hearing protection devices will be selected and worn in accordance with PRD-2108 or MCP-2719.

2.3.2 Temperature and Ultraviolet Light Hazards

Project tasks will be conducted during times when there is a potential for heat or cold stress that could present a potential hazard to personnel. The field team leader/subcontractor technical representative (FTL/STR) or job supervisor will be responsible for obtaining meteorological information to determine if additional thermal stress administrative controls are required. All project personnel must understand the hazards associated with heat and cold stress and take preventive measures to minimize the effects. MCP-2704 or PRD-2107, "Heat and Cold Stress," guidelines will be followed when determining work rest schedules or when to halt work activities because of temperature extremes.

2.3.2.1 Heat Stress. High ambient air temperatures can result in increased body temperature, heat fatigue, heat exhaustion, or heat stroke that can lead to symptoms ranging from physical discomfort, to unconsciousness, to death. In addition, tasks requiring the use of protective equipment or respiratory protection prevent the body from cooling. Personnel must inform the FTL/STR or HSO when experiencing any signs or symptoms of heat stress or observing a fellow employee (i.e., buddy) experiencing them. Heat stress stay times will be documented on the appropriate work control document(s) (e.g., an SWP, Prejob Briefing Form, or other) by the HSO in conjunction with the IH (as required) when personnel wear PPE that may increase heat body burden. These stay times will take into account the amount of time spent on a task, the nature of the work (i.e., light, moderate, or heavy), type of PPE worn, and ambient work temperatures. Table 2-5 lists heat stress signs and symptoms of exposure.

Table 2-5. Heat stress signs and symptoms of exposure.

Heat-Related Illness	Signs and Symptoms	Emergency Care
Heat rash	Red skin rash and reduced sweating	Keep the skin clean, change all clothing daily, and cover affected areas with powder containing cornstarch or with plain cornstarch.
Heat cramps	Severe muscle cramps and exhaustion, sometimes with dizziness or periods of faintness	Move the patient to a nearby cool place; give the patient half-strength electrolytic fluids; if cramps persist or if signs that are more serious develop, seek medical attention.
Heat exhaustion	Rapid, shallow breathing; weak pulse; cold, clammy skin; heavy perspiration; total body weakness; dizziness that sometimes leads to unconsciousness	Move the patient to a nearby cool place, keep the patient at rest, give the patient half-strength electrolytic fluids, treat for shock, and seek medical attention. DO NOT TRY TO ADMINISTER FLUIDS TO AN UNCONSCIOUS PATIENT.
Heat stroke	Deep, then shallow, breathing; rapid, strong pulse, then rapid, weak pulse; dry, hot skin; dilated pupils; loss of consciousness (possible coma); seizures or muscular twitching	Cool the patient rapidly. Treat for shock. If cold packs or ice bags are available, wrap them and place one bag or pack under each armpit, behind each knee, one in the groin, one on each wrist and ankle, and one on each side of the neck. Seek medical attention as rapidly as possible. Monitor the patient's vital signs constantly. DO NOT ADMINISTER FLUIDS OF ANY KIND.

Note: Heat exhaustion and heat stroke are extremely serious conditions that can result in death and should be treated as such. The FTL/STR or designee should immediately request that an ambulance (777 or 526-1515) be dispatched from the Central Facilities Area (CFA) medical facility (CFA-1612), and the individual should be cooled as described above in Table 2-5 based on the nature of the heat stress illness.

2.3.2.2 Low Temperatures and Cold Stress. Personnel will be exposed to low temperatures during fall and winter months or at other times of the year if relatively cool ambient temperatures combined with wet or windy conditions exist. Table 2-6 provides the cold stress work and warm-up schedule if cold stress conditions exist (late fall, winter, early spring).

Additional cold weather hazards may exist from working on snow- or ice-covered surfaces. Slip, fall, and material-handling hazards are increased under these conditions. Every effort must be made to ensure walking surfaces are kept clear of ice. The FTL/STR or HSO should be notified immediately if slip or fall hazards are identified at the project locations.

2.3.2.3 Ultraviolet Light Exposure. Personnel will be exposed to ultraviolet light (UV) (i.e., sunlight) when conducting project tasks. Sunlight is the main source of UV known to damage the skin and to cause skin cancer. The amount of UV exposure depends on the strength of the light, the length of exposure, and whether the skin is protected. No UV rays or suntans are safe. The following are mitigative actions to take to minimize UV exposure:

- Wear clothing to cover the skin (long pants [no shorts] and long-sleeve or short-sleeve shirt [no tank tops])
- Use a sunscreen with a sun protection factor of at least 15
- Wear a hat (hard hat where required)
- Wear UV-absorbing safety glasses
- Limit exposure during peak intensity hours of 10 a.m. to 4 p.m. whenever possible.

2.3.3 Inclement Weather Conditions

When inclement or adverse weather conditions develop that may pose a threat to persons or property at the project site (e.g., sustained strong winds 25 mph or greater, electrical storms, heavy precipitation, or extreme heat or cold), conditions will be evaluated and a decision made by the HSO with input from other personnel to halt work, employ compensatory measures, or proceed. The FTL/STR and HSO will comply with INL MCPs and facility work control documents that specify limits for inclement weather.

Table 2-6. Cold stress work and warmup schedule.

Air Temperature °F (approximate)	No Noticeable Wind		Wind 5 mph		Wind 10 mph		Wind 15 mph		Wind 20 mph	
	Maximum Work Period	Number of Breaks	Maximum Work Period	Number of Breaks	Maximum Work Period	Number of Breaks	Maximum Work Period	Number of Breaks	Maximum Work Period	Number of Breaks
-15 to -19°	Normal breaks	1	Normal breaks	1	75 minutes	2	55 minutes	3	40 minutes	4
-20 to -24°	Normal breaks	1	75 minutes	2	55 minutes	3	40 minutes	4	30 minutes	5
-25 to -29°	75 minutes	2	55 minutes	3	40 minutes	4	30 minutes	5	Nonemergency work should cease	
-30 to -34°	55 minutes	3	40 minutes	4	30 minutes	5	Nonemergency work should cease			
-35 to -39°	40 minutes	4	30 minutes	5	Nonemergency work should cease					
-40 to -44°	30 minutes	5	Nonemergency work should cease							
-45° and below	Nonemergency work should cease									

2.3.4 Biological Hazards

The INL is located in an area that provides habitats for various rodents, insects, and vectors (i.e., organisms that carry disease-causing microorganisms from one host to another). The potential exists for encountering nesting materials or other biological hazards and vectors. The Hantavirus may be present in the nesting and fecal matter of deer mice. If such materials are disturbed, they can become airborne and create a potential inhalation pathway for the virus. Contact and improper removal of these materials may provide additional inhalation exposure risks.

If suspected rodent nesting or excrement material is encountered, the industrial hygienist will be notified immediately and no attempt will be made to remove or clean the area. Following an evaluation of the area, disinfection and removal of such material will be conducted in accordance with MCP-2750, "Preventing Hantavirus Infection."

Snakes, insects, and arachnids (e.g., spiders, ticks, and mosquitoes) also may be encountered. Common areas to avoid include material stacking and staging areas, under existing structures (e.g., trailers and buildings), under boxes, and other areas that provide shelter. Protective clothing will generally prevent insects from having direct contact with the skin. If potentially dangerous snakes or spiders are found or are suspected of being present, warn others, keep clear, and contact the industrial hygienist or HSO for additional guidance as required.

Insect repellant (DEET or equivalent) may be required. Areas where standing water has accumulated (e.g., evaporation ponds) provide breeding grounds for mosquitoes and should be avoided. In cases where a large area of standing water is encountered, it may be necessary to pump the water out of the declivity (areas other than the evaporation ponds).

2.3.5 Confined Spaces

There are no identified confined spaces at OU 3-13, Group 3 project sites. Contact the industrial hygienist if there is any question as to whether a space may meet the definition of a confined space. If entry into a confined space is required, then all requirements of MCP-2749, "Confined Spaces," will be followed.

Note: The competent person for an excavation will stop work and consult the HSO and IH should the atmosphere in the excavation become hazardous.

2.4 Other Work-Site Hazards

Work-site personnel should continually look for potential hazards and immediately inform the FTL/STR or HSO of the hazards so that action can be taken to correct the condition. All personnel have the authority to initiate STOP WORK actions in accordance with PRD-1004 or MCP-553, "Stop Work Authority," if it is perceived that an imminent safety or health hazard exists, or take corrective actions within the scope of the work control authorization documents to correct minor safety or health hazards, and then inform the FTL/STR.

Personnel working at the work site are responsible to use safe-work practices, report unsafe working conditions or acts, and exercise good housekeeping habits with respect to tools, equipment, and waste throughout the course of the project.

2.5 Site Inspections

Project personnel may participate in site inspections during the work control preparation stage (such as the hazard identification and verification walkdowns) and conduct self-assessments or other inspections. Additionally, periodic safety inspections will be performed by the HSO, project manager, or STR in accordance with MCP-3449, "Safety and Health Inspections."

Targeted or required self-assessments may be performed during investigation and sampling operations in accordance with MCP-8, "Self-Assessment Process for Continuous Improvement." All inspections and assessments will be documented and available for review by the FTL/STR. These inspections will be noted in the logbook. Health and safety professionals present at the work site may, at any time, recommend changes in work habits to the FTL/STR. However, all changes that may affect the work control documents must have concurrence from the appropriate project technical representatives and a data analysis report must be prepared when required.

2.6 Direct-Push Probe Installation

Probes may be installed using a hydraulically powered, direct-push probing rig (e.g., AMS PowerProbe, Geoprobe, Stratoprobe or similar unit) to advance a hollow probe casing from the land surface to the desired depth.

Direct-push drilling using a hydraulically powered, direct-push probing rig and dual-tube sampling system may be used to install coreholes. The sample system can be attached in 4-ft or 5-ft lengths (depending on the type of tooling used) as the corehole is advanced. Samples may be pulled in 2- or 4-ft and composited in desired increments.

Figure 2-1 shows the direct-push dual-tube sampling sequence. One set of rods is driven into the ground as an outer casing. These rods receive driving force from the hammer and provide a sealed hole from which soil samples may be recovered without the threat of cross-contamination. The second, smaller set of rods is placed inside the outer casing and is advanced along with the outer casing. The smaller rods hold a sample liner in place as the outer casing is driven down one sampling interval. The small rods are then retracted to retrieve the filled liner while the outer rods are left in place. After any needed decontamination, the sampling tool and inner rods can then be reinstalled down the center of the drive casing, and sampling can continue to the next sampling interval.

The dual-tube sampling system is recommended in sandy or loamy soils where the borehole might collapse. The outer tubing acts as a support for the borehole and allows the soil sample to be collected without the risk of inadvertently collecting soil from shallower depths that fell into the open borehole. The dual-tube soil sampling system is also recommended for use in highly contaminated soils. The outer tube prevents cross-contamination of a soil sample with material from other depths.

Probe installation allows for in situ characterization of soils for radiological contamination as indicated by gross gamma. The hollow probe casing is advanced to the sediment/basalt interface or until refusal, the probe casing recovered, and the probing rig/vehicle relocated to another probehole location. Final depths of each probehole will vary based on the depth of the sediment/basalt interface or refusal. Soil is displaced laterally with the direct-push monitoring probe installation, thus eliminating accumulation of surface drill cuttings. The probeholes may be logged with an in situ (downhole) radionuclide assay system to detect gamma radiation. Gross gamma results obtained may be used to guide installation of subsequent borings. If proposed boring locations are changed because of information obtained in the field, all required excavation clearances must be obtained before commencing the boring at the new locations.

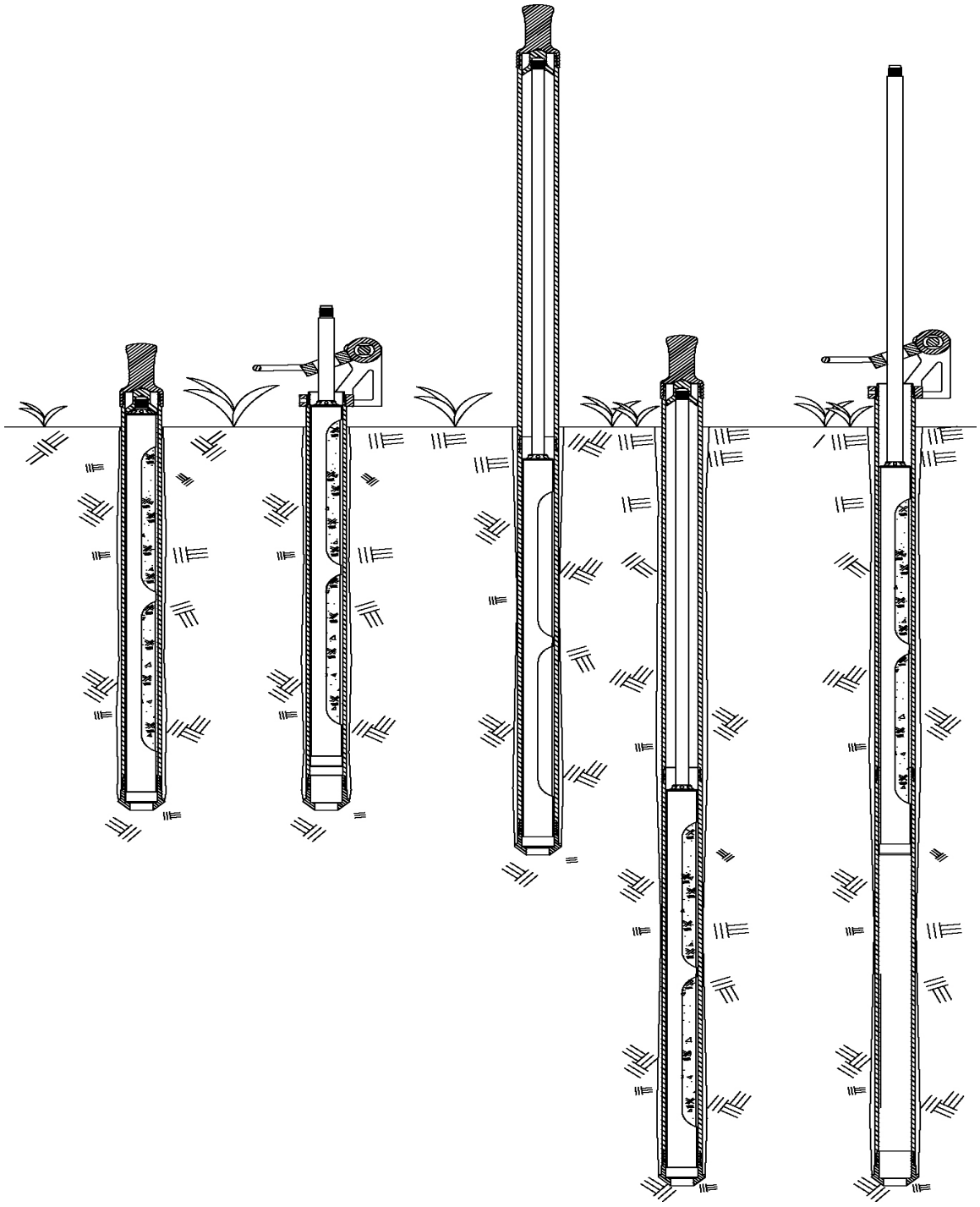


Figure 2-1. Typical direct-push dual-tube sampling sequence (from Geoprobe Systems® Tools Catalog, Volume 6).

To abandon push probes in place, upon reaching the target depth, pushing/hammering will cease and the casing will be detached from the rig at the lowest possible position. After gamma logging is completed, the casing may be terminated below ground surface, filled with sand, capped with bentonite, covered with native soil, and abandoned in place in accordance with well abandonment procedures.

Probing activities may only proceed after completion of a subsurface investigation. Real-time radiological field screening activities will be conducted as probing through the surface sediments occurs, and readings with estimated depths will be recorded in the field notes. If required by the RCT, radioisotope smears of push probe equipment will be collected and analyzed before movement of the vehicle to the next location.

2.7 Hand-Augering

Some boreholes may be hand-augered using a 4-in. OD hand auger or smaller diameter, as applicable. These borings may be installed with the vacuum lance as appropriate. The purpose of using a hand auger is to avoid any damage to subsurface structures or utilities. Upon reaching total depth, the hand auger will be removed from the hole and the steel probe casing will be installed. The annular space between the casing and the bore wall will be filled with bentonite chips, as necessary. Soil material, including rock and debris, will be placed into a drum or similar receptacle approved by INL RadCon. About 0.1 ft^3 of soil per foot of depth is expected to be removed from a 4-in.-diameter boring.

3. EXPOSURE MONITORING AND SAMPLING

A potential for exposure to certain appropriate hazards (radiological, chemical, or physical) exists during project tasks while work proceeds in the proximity of the contaminated soil or material removal activities and may affect all personnel who work in the controlled work area or controlled contamination reduction zone and exclusion zone. Refinement of work control zones (see Section 7), use of engineering and administrative controls, worker training, and wearing PPE provides the mitigation strategy for these hazards. Monitoring and sampling will be used during project tasks to (1) assess the effectiveness of these controls, (2) determine the type of PPE needed for individual tasks, and (3) determine the need for upgrading and downgrading of PPE as described in Section 5. Monitoring will be conducted in and around the active work location(s) as frequently as determined appropriate by the radiological control technician (RCT) and industrial hygienist for their respective fields of expertise.

Table 3-1 lists the tasks and hazards to be monitored, the frequency, and the monitoring instruments. Table 3-2 lists the action levels and associated responses for specific hazards.

3.1 Exposure Limits

Exposure limits identified in Table 3-2 serve as the initial action limits for specific chemical, physical, and radiological hazards. Other chemical or physical hazard action levels are established at one-half of the more stringent published permissible exposure limit (PEL) or threshold limit value (TLV). Project tasks will be continually assessed in accordance with PRD-25, "Activity Level Hazard Identification, Analysis, and Control," and evaluated by Radiological Control (RadCon) and Industrial Hygiene personnel to ensure engineering control effectiveness. Action limits should be adjusted as required based on changing site conditions, exposure mitigation practices, and PPE levels.

3.2 Environmental and Personnel Monitoring

Industrial Hygiene and RadCon personnel will conduct initial, periodic, or continuous monitoring with direct reading instrumentation, will perform contamination surveys, or will conduct full- and partial-period air sampling, as deemed appropriate in accordance with the applicable MCPs, in accordance with OSHA substance-specific standards, and as stated on the RWP. Instrumentation listed in Table 3-1 will be selected based on the site-specific conditions and contaminants associated with project tasks. Radiological control personnel and the industrial hygienist will be responsible for determining the best monitoring techniques for radiological and nonradiological contaminants (respectively). Biological, environmental, and physical hazards will be monitored and mitigated as outlined in Section 2.

3.2.1 Industrial Hygiene Area and Personal Monitoring and Instrument Calibration

The project industrial hygienist will conduct full- and partial-period sampling of airborne contaminants and monitoring of physical agents at a frequency deemed appropriate based on direct-reading instrument readings and changing site conditions. All air sampling will be conducted using applicable National Institute of Occupational Safety and Health (NIOSH), OSHA, or other validated methods. Both personal and area sampling and monitoring may be conducted.

Various direct-reading instruments may be used to determine the presence of nonradiological and other physical agents. The frequency and type of sampling and monitoring will be determined by changing site conditions, direct-reading instrument results, observation, professional judgment, and in accordance with the MCP-153, "Industrial Hygiene Exposure Assessment."

Table 3-1. Tasks and hazards to be monitored and monitoring instruments.[a,b]

Tasks	Hazard(s) to be Monitored	Instrument Category to be Used[c]
Waste loading	Ionizing radiation—alpha, beta, gamma	1
	Radionuclide contamination—alpha, beta, gamma	2
	Chemical constituents—organic vapors, lead, cadmium	3, 4
	Respirable dust—silica (area and personal)	3, 5
	Hazardous noise	6
	Ergonomics, repetitive motion, lifting	7
	Heat and cold stress	8
Waste transportation at site	Ionizing radiation—alpha, beta, gamma	1
	Radionuclide contamination—alpha, beta, gamma	2
	Respirable dust—silica (area)	4,5
Waste excavation	Ionizing radiation—alpha, beta, gamma	1
	Radionuclide contamination—alpha, beta, gamma	2
	Chemical constituents—organic vapors, lead	3, 4
	Respirable dust—silica (area and personal)	3, 5
	Hazardous noise	6
	Ergonomics, repetitive motion, lifting	7
	Heat and cold stress	8
Direct-push probing of contaminated soils	Ionizing radiation—(beta, gamma)	1
	Radionuclide contamination—(alpha, beta, gamma)	1a
	Airborne radionuclide contamination	2
	Chemical constituents—organic vapors, metals	3, 4
	Respirable dust—silica (area and personal)	3, 5
	Hazardous noise	6
	Ergonomics, repetitive motion, lifting	7
	Heat and cold stress	8
	Ionizing radiation—(beta, gamma)	1
Heavy equipment operations	Respirable dust—silica (area and personal)	4, 5
	Hazardous noise	6
	Ergonomics, repetitive motion, lifting	7
Decontamination of equipment	Radionuclide contamination—alpha, beta, gamma	2
	Chemical constituents—organic vapors, lead, cadmium	3, 4
	Hazardous noise	6
	Ergonomics, repetitive motion, lifting	7
	Heat and cold stress	8

Table 3-1. (continued).

Tasks	Hazard(s) to be Monitored	Instrument Category to be Used[c]
a. Monitoring and sampling will be conducted as deemed appropriate by project Industrial Hygiene and Radiological Control personnel based on specific tasks and site conditions. b. Equivalent instrumentation other than those listed may be used. c. 1 = (Alpha) Count rate—Bicron/NE Electra (DP-6 or AP-5 probe) or equivalent. Stationary—Eberline RM-25 (HP-380AB or HP-380A probe) or equivalent. (Beta-gamma) Count rate—Bicron NE/Electra (DP-6, BP-17 probes) or equivalent. Stationary—Eberline RM-25 (HP-360AB probe) or equivalent. 2 = Continuous air monitor (CAM)—ALPHA 6-A-1 (in-line and radial sample heads, pump, RS-485) or equivalent (as required). CAM (beta)—AMS-4 (in-line and radial head, pump RS-485) or equivalent (as required). Grab sampler—SAIC H-810 or equivalent. 3 = (Organic vapor) Direct reading instruments (photoionization detector, flame ionization detector, or infrared detector) detector tubes or grab samples. (Dust) Direct-reading instrument (miniram). 4 = (Organic vapors and lead) Personal sampling pumps with appropriate media for partial and full period sampling using NIOSH or OSHA-validated methods. 5 = (Silica dust, respirable) NIOSH 7500 or equivalent, personal sampling pump, 10-mm cyclone, full-period sampling. 6 = American National Standards Institute (ANSI) Type S2A sound level meter or ANSI S1.25-1991 dosimeter (A-weighted scale for time-weighed average dosimetry, C-weighted for impact dominant sound environments). 7 = Observation and ergonomic assessment of activities in accordance with PRD-2016/MCP-2739, “Material Handling, Storage, and Disposal,” and ACGIH TLV. 8 = Heat stress—wet-bulb globe temperature, body weight, fluid intake. Cold stress—ambient air temperature, wind chill charts.		

Table 3-2. Action levels and associated responses for OU 3-13, Group 3, hazards.

Contaminant/Agent Monitored	Action Level	Response Taken If Action Levels Are Exceeded
Nuisance particulates (not otherwise classified)	>10 mg/m^3 (inhalable fraction) >3 mg/m^3 (respirable fraction)	Move personnel to upwind position of source and close equipment cab windows and doors. Use wetting or misting methods to minimize dust and particulate matter. IF wetting or misting methods prove ineffective, THEN don respiratory protection[a] (as directed by industrial hygienist).
Lead dust	≥30 $\mu g/m^3$ (29 CFR 1910.1025)	Move personnel to upwind position of source. Use wetting or misting methods to minimize dust and particulate matter during mixing. IF wetting or misting methods prove ineffective, THEN don respiratory protection[a] and institute medical surveillance requirements for exposure to lead.
Cadmium dust	≥2.5 $\mu g/m^3$ (29 CFR 1910.1027)	Move personnel to upwind position of source. Use wetting or misting methods to minimize dust and particulate matter during mixing. IF wetting or misting methods prove ineffective, THEN don respiratory protection[a] and institute medical surveillance requirements for exposure to cadmium.
Silica (respirable fraction)	Greater than or equal to the Occupational Safety and Health Administration permissible exposure limit of $\frac{10\ mg/m^3}{\%silica + 2}$ (29 CFR 1910.1000 [Z3])	Move personnel to upwind position of source. Use wetting or misting methods to minimize dust and particulate matter during mixing. IF wetting or misting methods prove ineffective, THEN don respiratory protection[a] (as directed by industrial hygienist).

Table 3-2. (continued).

Contaminant/Agent Monitored	Action Level	Response Taken If Action Levels Are Exceeded
Organic Vapors	5 ppm sustained. (A sustained concentration is a 1-minute period monitored with an appropriate instrument such as a mini-RAE photo-ionization detector that results in a reading at or above the specified action level.)	Move personnel to upwind position of source. Notify the FTL/STR, HSO, and Industrial Hygienist. The HSO, FLT, Job Supervisor, and IH will formulate a return to work plan. Basic elements of the plan are: 1. The IH will identify the source of the gas or vapors using appropriate PPE and instrumentation 2. Assess the risk and consult ICP management if more information is needed 3. Select and implement control measures 4. Return to work. Document the plan in the FTL logbook.
Hazardous noise levels	<85 decibel A-weighted (dBA) 8-hour time-weighted average (TWA), <83 dBA 10-hour TWA	No action.
	85 to 114 dBA	Hearing protection required to attenuate hazard to below 85 dBA 8-hour TWA or 83 dBA for 10-hour TWA (device noise reduction rating [NRR]).
	(a) >115 dBA (b) >140 dBA	(a) Isolate source, evaluate NRR for single device, double protection as needed. (b) Control entry, isolate source, only approved double protection worn.
Radiation field	<5 mrem/hour	No action, no posting required.
	5 to 100 mrem/hour @ 30 cm (10 CFR 835.603.b)	Post as “Radiation Area”—Required items: Radiological Worker (RW) I or II training, radiological work permit (RWP), personal dosimetry.
	>100 mrem to 500 rad @ 100 cm (10 CFR 835.603.b)	Post as “High Radiation Area”—Required items: RW II, RWP, alarming personal dosimetry, dose rate meter, and temporary shielding (as required).

Table 3-2. (continued).

Contaminant/Agent Monitored	Action Level	Response Taken If Action Levels Are Exceeded
Radionuclide contamination	1 to 100 times Radiological Control Manual[b] Table 2-2 values (10 CFR 835.603.d)	Post as "Contamination Area"—Required items: RW II training, personal dosimetry, RWP, don PPE, bioassay submittal (as required).
	>100 times Radiological Control Manual[b] Table 2-2 values (10 CFR 835.603.d)	Post as "High Contamination Area"—Required items: RW II training, personal dosimetry, RWP (with prejob briefing), don PPE, bioassay submittal (as required).
Airborne radioactivity	Concentrations (μCi/cc) >30% of a derived air concentration value (10 CFR 835.603.d)	Post as "Airborne Radioactivity Area"—Required items: RW II training, personal dosimetry, RWP (with prejob briefing), don PPE, bioassay submittal (as required).

a. Level C respiratory protection will consist of a full-face respirator equipped with a high-efficiency particulate air filter cartridge as prescribed by the project Industrial Hygiene and Radiological Control personnel (based on contaminant of concern). See Section 5 for additional Level C requirements.

b. Companywide Manual 15, "Radiation Protection – INEEL Radiological Control" (PRD-183).

All monitoring instruments will be maintained and calibrated in accordance with the manufacturer's recommendations, existing industrial hygiene protocol, and in conformance with the companywide safety and health manuals (Manual 14A and 14B). Direct reading instruments will be calibrated, at a minimum, before daily use and more frequently as determined by the project industrial hygienist. Calibration information, sampling and monitoring data, results from direct-reading instruments, and field observations will be recorded as stated in Section 12.

3.2.2 Area Radiological Monitoring and Instrument Calibration

Area radiological monitoring (radiation and contamination) will be conducted during project tasks to ensure that personnel are given adequate protection from potential radiological exposure. Instruments and sampling methods listed in Table 3-1 may be used by the RCT as deemed appropriate and as required by project or task-specific RWPs. When conducted, monitoring will be performed in accordance with Manual 15B, "Radiation Protection Procedures," and 15C, "Radiological Control Procedures." The data obtained from monitoring will be used by RadCon personnel to evaluate the effectiveness of engineering controls and decontamination methods and procedures, and to alert personnel to potential radiation sources.

Radiological Control personnel will use radiation and contamination detectors and counters listed in Table 3-1, or equivalent instruments, to provide radiological information to personnel. Daily operational and source checks will be performed on all portable survey instruments to ensure they are within the specified baseline calibration limits. Accountable radioactive sources will be maintained in accordance with MCP-137, "Radioactive Source Accountability and Control." All radiological survey and monitoring equipment will be maintained and calibrated in accordance with the manufacturer's recommendations and existing RadCon protocol, and in conformance with MCP-93, "Health Physics Instrumentation."

3.2.3 Personnel Radiation Exposure Monitoring

Personal radiation monitoring will be conducted to quantify external radiation exposure and potential for uptakes of radioactive material as stated in the project or task-specific RWP. This may include the use of external dosimetry, surface monitoring, and internal dosimetry methods to ensure that engineering controls, administrative controls, and work practices are effectively mitigating radiological hazards.

3.2.3.1 External Dosimetry. Dosimetry requirements will be based on the radiation exposure potential during project tasks. When dosimetry is required, all personnel who enter the project area will be required to wear personal dosimetry devices, as specified by RadCon personnel and the RWP, and in accordance with Manual 15A, "Radiological Protection Manual" (PRD-183).

When RWPs are required for project tasks, the Radiological Control and Information Management System (RCIMS) will be used to track external radiation exposures to personnel. Individuals are responsible for ensuring all required personal information is provided to RadCon personnel for entry into RCIMS and for logging into RCIMS when electronic dosimeters are used.

3.2.3.2 Internal Dosimetry. The purpose of internal dose monitoring is to demonstrate the effectiveness of contamination control practices and to document the nature and extent of any internal uptakes that may occur. Internal dose evaluation programs will be adequate to demonstrate compliance with 10 CFR 835, "Occupational Radiation Protection." The requirement for whole body counts and bioassays will be based on specific project tasks or activities and will be determined by the radiological engineer. Bioassay requirements will be specified on the RWP and project personnel will be responsible for submitting required bioassay samples upon request.

4. ACCIDENT AND EXPOSURE PREVENTION

Project activities will present numerous safety, physical, chemical, and radiological hazards to personnel conducting these tasks. It is critical that all personnel understand and follow the site-specific requirements of this HASP. Engineering controls, hazard isolation, specialized work practices, and the use of PPE will all be implemented to eliminate or mitigate all potential hazards and exposures where feasible. However, all personnel are responsible for the identification and control of hazards in their work area in accordance with Integrated Safety Management System (ISMS) principles and practices. **At no time will hazards be left unmitigated without implementing some manner of controls (e.g., engineering controls, administrative controls, or the use of PPE).** Project personnel should use stop work authority in accordance with PRD-1004 or MCP-553, "Stop Work Authority," where it is perceived that imminent danger to personnel, equipment, or the environment exists.

This HASP is to be used in conjunction with PRD-25, "Activity Level Hazard Identification, Analysis, and Control," and work authorization and control documents such as STD-101, "Integrated Work Control Process"; work orders; JSAs; MCP-3562, "Hazard Identification, Analysis, and Control of Operational Activities"; and operational TPRs. Where appropriate, MCP-3562 and GDE-6212, "Hazard Mitigation Guide for Integrated Work Control Process"; mitigation guidance; JSAs; and RWPs will be incorporated into applicable sections of the HASP.

4.1 Voluntary Protection Program and Integrated Safety Management

ICP safety processes embrace the Voluntary Protection Program (VPP) and ISMS criteria, principles, and concepts to identify and mitigate hazards, thereby preventing accidents. All management and workers are responsible for implementing safety policies and programs and for maintaining a safe and healthful work environment. Project personnel are expected to take a proactive role in preventing accidents, ensuring safe working conditions for themselves and fellow personnel, and complying with all work control documents, procedures, and permits.

ISMS is focused on the **system** side of conducting operations and **VPP** concentrates on the **people** aspect of conducting work. Both programs define work scope, identify and analyze hazards, and mitigate the hazards. Additional information on these programs is available on the INL and CWI Intranets. CWI (current primary management and operating contractor) and its subcontractors participate in VPP and ISMS for the safety of their employees. This document includes all elements of both systems. The five key elements of VPP and ISMS and their corresponding HASP sections are shown in Table 4-1.

Table 4-1. Correlation between VPP, ISMS, and HASP sections.

Voluntary Protection Program	Integrated Safety Management System	Health and Safety Plan Section
	Define work scope	Section 1
Work site analysis	Analyze hazards	Sections 2, 3, 5, 7, 10
Hazard prevention and control	Develop and implement controls	Sections 2, 3, 4, 5, 7, 10, 11
Safety and health training	Perform within work controls	Section 6
Employee involvement	Perform within work controls	Sections 2, 3, 4, 8
Management leadership	Provide feedback and improvement	Sections 6, 9

4.2 General Safe Work Practices

Sections 1 and 2 defined the project scope of work and associated project-specific hazards and mitigation. The following practices are mandatory for all project personnel to further reduce the likelihood of accidents and injuries. All visitors permitted to enter work areas must follow these requirements. Failure to follow these practices may result in permanent removal from the project and other disciplinary actions. The project FTL/STR and HSO will be responsible to ensure that the following safe-work practices are adhered to at the project site:

- Limit work area access to authorized personnel only, in accordance with PRD-1007, "Work Coordination and Hazard Control," and Section 7.

- All personnel have the authority to initiate STOP WORK actions in accordance with PRD-1004, or MCP-553.

- Personnel will not eat, drink, chew gum or tobacco, smoke, apply sunscreen, or perform any other practice that increases the probability of hand-to-mouth transfer and ingestion of materials in work areas, except within designated areas.

- Be aware of and comply with all safety signs, tags, barriers, and color codes as identified in accordance with PRD-2022, "Safety Signs, Color Codes, and Barriers," or PRD-5117, "Accident Prevention Signs, Tags, Barriers, and Color Codes."

- Be alert for dangerous situations, strong or irritating odors, airborne dusts or vapors, and spills. Report all potentially dangerous situations to the FTL/STR or HSO.

- Avoid direct contact with hazardous materials or wastes. Personnel will not walk through spills or other areas of contamination and will avoid kneeling, leaning, or sitting on equipment or surfaces that may be contaminated.

- Be familiar with the physical characteristics of the project site and/or facility, including, but not limited to:

    - Prevailing wind direction

    - Location of fellow personnel, equipment, and vehicles

    - Communications at the project site and with INTEC

    - Area and the type of hazardous materials stored and waste disposed of there

    - Major roads and means of access to and from the project site

    - Location of emergency equipment

    - Warning devices and alarms for area or facility

    - Capabilities and location of nearest emergency assistance.

- Report all broken skin or open wounds to the operations manager, FTL/STR, or HSO. An OMP physician must examine all wounds to determine the nature and extent of the injury. If required to enter into a radiological contamination area, a RadCon supervisor will determine whether the wound can be bandaged adequately in accordance with Article 542 of the Manual 15A, "INEEL Radiological Control Manual" (PRD-183).

- Prevent releases of hazardous materials. If a spill occurs, personnel must try to isolate the source (if possible and if this does not create a greater exposure potential) and then report it to the FTL/STR, or HSO. The Warning Communications Center (WCC) or INTEC shift supervisor or technical lead will be notified and additional actions will be taken, as described in Section 10. Appropriate spill response kits or other containment and absorbent materials will be maintained at the project site.

- Illumination levels during project tasks will be in accordance with 29 CFR 1910.120 (Table H-120.1, "Minimum Illumination Intensities in Foot-Candles").

- Ground-fault protection will be provided whenever electrical equipment is used outdoors.

- Keep all ignition sources at least 15 m (50 ft) from explosive or flammable environments and use nonsparking, explosion-proof equipment, if advised to do so by safety professionals.

- Follow all safety and radiological precautions and limitation of TPRs and requirements identified in work packages.

4.3 Subcontractor Responsibilities

Subcontractors are responsible for meeting all applicable MCP, PRD, VPP, and ISMS flow-down requirements such as those listed on the completed Form 540.10, "Subcontractor Requirements Manual (SRM) Applicability"; "Subcontractor Requirements Manual" (TOC-59); and contract general and special conditions. Additionally, subcontractors are expected to take a proactive role in hazard identification and mitigation while conducting project tasks, and report unmitigated hazards to the appropriate project point of contact after taking mitigative actions within the documented work controls.

Subcontractors shall follow the equipment manufacturer's preventive maintenance recommendations and instructions, safe operating instructions, and other industry standard safe work practices for the equipment.

4.4 Radiation and Chemical Exposure Prevention

Exposure to potential chemical, radiological, and physical hazards will be mitigated by using engineering controls, administrative controls, or PPE to prevent exposures where possible or minimize them where engineering controls are not feasible. All project personnel are responsible for understanding the hazard identification and mitigation measures necessary to prevent exposures.

4.4.1 Radiation Exposure Prevention – As Low as Reasonably Achievable Principles

Radiation exposure of project personnel will be controlled such that radiation exposures are well below regulatory limits and that there is no radiation exposure without commensurate benefit. **Unplanned and preventable exposures are considered unacceptable.** All project tasks will be evaluated with the goal of eliminating or minimizing exposures. All project personnel are responsible to follow the ALARA

principles and practices, and personnel working at the site must strive to keep both external and internal radiation doses ALARA by adopting the following practices discussed in the next two sections.

4.4.1.1 External Radiation Dose Reduction. Sources for external radiation exposure at the OU 3-13, Group 3 project sites include contaminated soils and materials. Radiological work permits will be written as required for project tasks that will define hold points, required dosimetry, RCT coverage, radiological areas, and radiological limiting conditions in accordance with MCP-7, "Radiological Work Permit." Radiological control personnel will participate in the prejob briefing required by MCP-3003, "Performing Prejob Briefings and Postjob Reviews," to ensure all personnel understand the limiting conditions on the RWP. All personnel will be required to read and acknowledge the RWP requirements before being allowed to sign the RWP (or scan the RWP bar code) and obtain electronic dosimetry, if required.

Basic protective measures used to reduce external doses include (1) minimizing time in radiation areas, (2) maximizing the distance from known sources of radiation, and (3) using shielding whenever possible. The following are methods to minimize external dose:

Methods for Minimizing Time

- Plan and discuss the tasks before entering a radiation area (including having all equipment and tools prepared).
- Perform as much work as possible outside radiation areas and take advantage of lower dose rate areas (as shown on the radiological survey maps).
- Take the most direct route to the tasks and work efficiently.
- If problems occur in the radiation areas, hold technical discussions outside radiation areas, then return to the work area to complete the task.
- If stay times are required, know your stay time and use appropriate signal and communication methods to let others in the area know when the stay time is up.
- Respond to electronic dosimetry alarms by notifying others in the area and the RCT and exiting the radiation area through the designated entry and exit point.
- Know your current dose and your dose limit. DO NOT EXCEED YOUR DOSE LIMIT.

Methods for Maximizing Distance from Sources of Radiation

- Use remote-operated equipment or controls where required
- Stay as far away from the source of radiation as possible (extremely important for point sources where, in general, if the distance between the source is doubled, the dose rate falls to one-fourth of the original dose rate)
- Become familiar with the radiological survey map for the area in which work will be performed, as well as high- and low-dose-rate locations, and take advantage of low-dose-rate areas.

Proper Use of Shielding

- Know what shielding is required and how it is to be used for each radiation source
- Take advantage of the equipment and enclosures for shielding yourself from radiation sources
- Wear safety glasses to protect eyes from beta radiation.

4.4.1.2 Internal Radiation Dose Reduction. An internal radiation dose potential exists at the OU 3-13, Group 3 project sites from inhalation of contaminated material. An internal dose is the result of radioactive material being taken into the body. Radioactive material can enter the body through inhalation, ingestion, absorption through wounds, or injection from a puncture wound. Reducing the potential for radioactive material to enter the body is critical to avoid an internal dose. The following are methods to minimize internal radiation dose hazard:

- Know the potential and known contamination sources and locations, and minimize or avoid activities in those areas
- Wear protective clothing and respiratory protection as identified on the RWP, perform all respirator leak checks, and inspect all PPE before entering contaminated areas or areas with airborne radioactivity
- Use a high-efficiency particulate air (HEPA) filter exhaust system
- When inside contaminated areas, do not touch your face (adjust glasses or PPE) or other exposed skin
- When exiting contaminated areas, follow all posted instructions and remove PPE in the order prescribed (if questions arise, consult RadCon personnel)
- Conduct whole body personnel survey when exiting the contaminated area, then proceed directly to the personnel contamination monitor
- Report all wounds or cuts (including scratches and scrapes) before entering radiologically contaminated areas
- Wash hands and face before eating, drinking, smoking, or engaging in other activities that may provide a pathway for contaminants.

Monitoring for radiation and contamination during project tasks will be conducted in accordance with the RWP; PRD-183, “Radiation Protection - INEEL Radiological Control Manual”; Manual 15B, “Radiation Protection Procedures”; and Manual 15C, “Radiological Control Procedures”; and as deemed appropriate by RadCon personnel.

4.4.2 Chemical and Physical Hazard Exposure Avoidance

Note: Identification and control of exposures to carcinogens will be conducted in accordance with MCP-2703, "Carcinogens."

Threshold-limit values (TLVs) or other occupation exposure limits have been established for numerous chemicals and physical agents (e.g., noise, heat, or cold stress) that may be encountered. These exposure limits provide guidelines for evaluating airborne, skin, and physical agent exposures. The TLVs represent levels and conditions to which it is believed that nearly all workers may be exposed day after day without adverse health effects. The TLV-time-weighted average (TLV-TWA) is a time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse health effects. Action limits (instantaneous concentrations for short time periods) have been established (Section 3) to further reduce the likelihood of exceeding TLVs.

Controls will be employed to eliminate or mitigate chemical and physical hazards wherever feasible. The hierarchy of controls in order are (1) engineering controls, (2) administrative controls, and (3) PPE. In addition to these controls, use of TPRs and work orders, hold points, training, and monitoring of hazards will be used as appropriate to reduce exposure potential. Some methods of exposure avoidance include

- Wearing all required PPE, inspecting all pieces before donning, and taping all seams
- Changing PPE if it becomes damaged or shows signs of degrading
- Minimizing time in direct contact with hazardous material or waste
- Doffing PPE following standard practices (i.e., rolling outer surfaces in and down) and following doffing sequence
- Washing hands and face before eating, drinking, smoking, or engaging in other activities that may provide a pathway for contaminants.

4.5 Buddy System

The two-person or buddy system will be used during project tasks. The buddy system is most often used during project activities requiring the use of protective clothing and respiratory protection where heat stress and other hazards may impede a person's ability to self-rescue. The buddy system requires each employee to assess and monitor his or her buddy's mental and physical well being during the course of the operation. A buddy must be able to perform the following activities:

- Provide assistance if required
- Verify the integrity of PPE
- Observe his or her buddy for signs and symptoms of heat stress, cold stress, or contaminant exposure
- Notify other personnel in the area if emergency assistance is needed.

The buddy system will be administered by the FTL/STR in conjunction with the HSO.

5. PERSONAL PROTECTIVE EQUIPMENT

This section provides guidance for the selection and use of PPE to be worn for project tasks and contingencies for upgrading and downgrading PPE. Types of PPE are generally divided into two broad categories: (1) respiratory protective equipment and (2) nonrespiratory PPE. Both of these categories are incorporated into the standard two level of protection (Levels C and D).

The purpose of personal protective clothing and equipment is to shield or isolate individuals from the chemical, physical, radiological, and safety hazards that may be encountered during project tasks when engineering and other controls are not feasible or cannot provide adequate protection. It is important to realize that no one PPE ensemble can protect against all hazards under all conditions and that proper work practices and adequate training will serve to augment PPE to provide the greatest level of protection to workers.

Project field workers wear, as a minimum, sturdy leather boots above the ankles, safety glasses with side shields, hard hats, and highly reflective safety vests. The HSO or safety professional will determine where and when this requirement will be invoked for each project.

The type of PPE will be selected, issued, used, and maintained in accordance with PRD-2001 or PRD-5121. Selection of the proper PPE is based on the following considerations:

- Specific conditions and nature of the tasks (e.g., contaminated soil or material removal)
- Potential contaminant routes of entry
- Physical form and chemical characteristics of hazardous materials, chemicals, or waste
- Toxicity of hazardous materials, chemicals, or waste that may be encountered
- Duration and intensity of exposure (acute or chronic)
- Compatibility of chemical(s) with PPE materials and potential for degradation or breakthrough
- Environmental conditions (e.g., humidity, heat, cold, rain)
- The hazard analysis.

If radiological contamination is encountered at levels requiring the use of anti-contamination (Anti-C) clothing, a task-specific RWP will be developed and MCP-432 will be followed.

The PPE requirements for specific project tasks are identified in Table 5-1. This list may be augmented by an SWP or RWP. Potential exposures and hazards will be monitored (as discussed in Section 3) during the course of the project to evaluate changing conditions and to determine PPE level adequacy and modifications.

Level D is anticipated to be the initial level of PPE used for tasks except equipment decontamination. IH or RadCon personnel may change these requirements based on changing site conditions or increased potential for exposure.

Table 5-1. Task-based personal protective equipment requirements and modifications.

Task	Initial Level of Personal Protective Equipment	Upgrade Contingency	Downgrade Contingency	Upgrade or Downgrade Criteria	Personal Protective Equipment Modifications and Comments
Waste soil loading	D+	C	D	Upgrade to Level C if airborne concentrations exceed action limits. Downgrade to Level D if contact with waste containers can be avoided or surveys show no detectable contamination on surfaces.	Level C respiratory protection defined by industrial hygienist, based on airborne contaminant. Leather gloves for all material handling tasks.
Waste transport at work site	D	D+	Not applicable	Upgrade to Level D+ when attaching or removing straps if contamination is detected on the outside of waste containers.	D+ protective clothing consists of Tyvek hooded coveralls (or equivalent). Leather gloves.
Excavation of contaminated soils or materials	D+	C	D	Upgrade to Level C if airborne levels exceed action limits. Downgrade to Level D if contact with waste containers can be avoided or surveys show no detectable contamination on surfaces.	Level C respiratory protection defined by industrial hygienist, based on airborne contaminant. Leather gloves for all material handling tasks.
Heavy equipment operations	D	D+	Not applicable	Upgrade to Level D+ if contact with waste material cannot be avoided.	D+ protective clothing consists of Tyvek hooded coveralls (or equivalent). Leather gloves.
Backfilling excavations with “clean” material	D	C	Not applicable	Upgrade to Level C (appropriate respiratory protection only) if airborne concentrations of respirable dust or silica exceed the action limits.	Level C respiratory protection defined by industrial hygienist, based on airborne contaminant. Level C protective clothing consists of Tyvek hooded coveralls (or equivalent). Leather gloves for all material handling tasks.

Table 5-1. (continued).

Task	Initial Level of Personal Protective Equipment	Upgrade Contingency	Downgrade Contingency	Upgrade or Downgrade Criteria	Personal Protective Equipment Modifications and Comments
Equipment decontamination	C	C+	D+	Upgrade to Level C+ if splashing during decontamination of lead, cadmium, radiologically contaminated equipment cannot be avoided. Downgrade to Level D+ for decontamination of small items using spray and wipe decontamination methods.	Level C respiratory protection defined by industrial hygienist, based on airborne contaminant. Level C protective clothing consists of Tyvek (or equivalent) hooded coverall. Level C+ protective clothing consists of Saranex (or equivalent coated hooded coverall). Leather gloves over nitrile for equipment and material handling before or after decontamination tasks. Double-pair nitrile gloves during decontamination tasks.

5.1 Respiratory Protection

When controlling occupational diseases caused by breathing contaminated air, the primary objective will be to prevent atmospheric contamination. This will be accomplished as far as feasible by accepted engineering control measures (e.g., enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials). When effective engineering controls are not feasible or while they are being instituted, appropriate respiratory protection will be selected and used.

Required task-based respiratory protection and protective clothing are listed on Table 5-1. Respirators are not anticipated to be required for specific project tasks. All personnel required to wear respirators will complete training and be fit-tested before being assigned a respirator in accordance with the training and documentation requirements in Section 6. Requirements for respirator use, emergency use, storage, cleaning, and maintenance, as stated in 29 CFR 1910.134, "Respiratory Protection"; PRD-2109, "Respiratory Protection"; and the MCP-2726, "Respiratory Protection," will be followed.

5.2 Personal Protective Equipment Levels

Table 5-2 lists PPE requirements for the two levels of PPE that may be worn during the course of the project. Applicable PPE levels (D or C) will be required for conducting project tasks. Modifications to these levels will be made under the direction of the HSO in consultation with the project Industrial Hygiene and RadCon personnel, as appropriate. Such modifications are routinely employed during HAZWOPER site activities to maximize efficiency and to meet site-specific needs without compromising personnel safety and health.

5.2.1 Level D Personal Protective Equipment

Level D PPE includes, at a minimum, hard hat, safety glasses, sturdy leather boots, and a highly visible reflective vest (during heavy equipment operation). It may also include hand protection, coveralls, safety footwear, and radiological modesty garments in addition to specialized PPE (hearing protection, heavy aprons, welding goggles, etc.).

Level D PPE will only be selected for protective clothing and not on a site with respiratory or skin absorption hazards requiring whole-body protection. Level D PPE provides no protection against airborne chemical hazards, but rather is used for protection against surface contamination and physical hazards. Level D PPE will only be allowed in areas that have been characterized as having limited contamination hazards.

5.2.2 Level C Personal Protective Equipment

Level C PPE will be worn when the work site chemical or radiological contaminants have been well-characterized, indicating that personnel are protected from airborne exposures by wearing an air-purifying respirator with the appropriate cartridges, that no oxygen-deficient environments exist (less than 19.5% at sea level), and that there are no conditions that pose immediate danger to life or health (IDLH).

Table 5-2. Levels and options of personal protective equipment.

Personal Protective Equipment Level	Personal Protective Equipment Required	Optional Personal Protective Equipment or Modifications
D	Coveralls or standard work clothes (coverall material type based on industrial hygiene determination). Hard hat (unless working indoors with no overhead or falling debris hazards) meeting ANSI Z89.1 requirements. Eye protection (safety glasses meeting ANSI Z87.1 requirements as a minimum). Hand protection (material based on type of work and hazardous materials being handled). Safety footwear (steel or protective toe and shank) meeting ANSI Z41 requirements or sturdy leather above the ankle for construction tasks.	Chemical or radiological protective clothing (Tyvek or Saranex) specified by industrial hygienist or RCT. Chemically resistant hand and foot protection (e.g., inner and outer gloves and boot liners). Radiological modesty garments under outer protective clothing (as required by radiological work permit [RWP]). Any specialized protective equipment (e.g., hearing protection, cryogenic gloves, face shields, welding goggles, and aprons).
C	Level D ensemble with the following respiratory and whole-body protection upgrades:[a] • Full-facepiece air purifying respirator equipped with a NIOSH-approved HEPA filter or chemical combination cartridge (industrial hygienist to specify cartridge type) OR • An air hood operating at a minimum pressure of 6 cfm or a full-facepiece supplied air respirator with a 10-minute escape bottle, a self-contained breathing apparatus (SCBA) or an escape air-purifying combination HEPA or chemical cartridge (supplied air respirator hose length no more than manufacturer's specification and under no circumstances greater than 91 m [300 ft]) • Standard Tyvek (or equivalent) coverall OR • Chemical-resistant coveralls (e.g., Tyvek QC, Tychem 7500, or Saranex-23-P) (industrial hygienist to specify material).	Chemical-resistant outer shoe or boot cover (industrial hygienist or RCT to specify material). Inner chemical-resistant gloves with cotton liners (as determined by the industrial hygienist and RWP). Outer chemical-resistant gloves (as determined by the industrial hygienist). Radiological modesty garments under outer protective clothing (as required by RWP). Any specialized protective equipment (e.g., hearing protection, welding lens, and aprons).
B[b]	This ensemble is not expected to be needed.	
A[b]	This ensemble is not expected to be needed.	

a. Upgrades are determined by the industrial hygienist in conjunction with other environment, safety, and health professionals.
b. Level B and A work will require approval from the Idaho Closure Project safety, health, and quality assurance manager and coordination with the INL fire department.

Note: Personnel must inspect all PPE before donning and entry into any work zone. Items found to be defective or that become unserviceable during use will be doffed and disposed of in accordance with posted procedures and placed into the appropriate waste stream. The PPE inspection guidance is provided in Table 5-3.

5.2.3 Level B Personal Protective Equipment

Level B PPE will be worn when personnel cannot be adequately protected with air purifying respirator because there are high levels of contaminants present, the appropriate respirator cartridges or combination is not available, a significant hazard exists for skin exposure, or IDLH or oxygen-deficient conditions exist. If IDLH conditions do not exist, then an escape air-purifying cartridge may be substituted for the escape bottle. It is anticipated that Level B PPE will not be needed for OU 3-13, Group 3, Other Surface Soils, remediation operations.

5.2.4 Level A Personal Protective Equipment

Level A PPE has the maximum respiratory, skin, and eye protection and is suitable for use in situations where (1) the levels of contaminants are known to be very high and dangerous, (2) corrosive agents exist, (3) contaminant levels are completely unknown, or (4) an IDLH situation exists or such conditions could develop. It is anticipated that Level A PPE will not be needed for OU 3-13, Group 3, Other Surface Soils remediation operations.

Table 5-3. Inspection checklist for personal protection equipment.

Personal Protection Equipment Item	Inspection
Respirators (full-facepiece air-purifying)	Before use: Check condition of the facepiece, head straps, valves, connecting lines, fittings, and all connections for tightness. Check cartridge to ensure proper type or combination is being used for atmospheric hazards to be encountered, and inspect threads and O-rings for pliability, deterioration, and distortion.
Level D and C clothing	Before use: Visually inspect for imperfect seams and tears. Hold PPE up to the light and inspect for pinholes, deterioration, stiffness, and cracks. While wearing in the work zone: Inspect for evidence of chemical attack such as discoloration, swelling, softening, and material degradation. Inspect for tears, punctures, and zipper or seam damage. Check all taped areas to ensure they are still intact.
Gloves	Before use: Pressurize rubber gloves to check for pinholes: blow in the glove, then roll until air is trapped and inspect. No air should escape. Leather gloves: Inspect seams and glove surface for tears and splitting and verify no permeation has taken place.

5.3 Personal Protective Clothing Upgrading and Downgrading

The project HSO, in consultation with the project industrial hygienist and RadCon personnel, will be responsible for determining when to upgrade or downgrade PPE requirements. Upgrading or downgrading of PPE based on changing site conditions or activities is a normal occurrence. Action levels listed in Table 3-2 serve as the initial basis for making such decisions. Additional reasons for upgrading or downgrading are listed in the following sections.

5.3.1 Upgrading Criteria for Personal Protective Equipment

The level of PPE required will be upgraded for the following reasons and work will halt until PPE upgrading has been completed:

- Identification of new, unstable, or unpredictable site hazards
- Temporary loss or failure of any engineering controls
- Presence of contaminants that present difficulty in monitoring or detecting
- Known or suspected presence of skin absorption hazards
- Identified source or potential source of respiratory hazard(s) not anticipated
- Change in the task procedure that may result in an increased contact with contaminants or meeting any of the criteria listed above.

5.3.2 Downgrading Criteria

The level of PPE will be downgraded under the following conditions:

- Elimination of hazard or completion of task(s) requiring specific PPE
- Implementation of new engineering or administrative controls that eliminate or significantly mitigate hazard
- Sampling information or monitoring data that show the contaminant levels to be stable and lower than established action limits
- Elimination of potential skin absorption or contact hazards.

5.4 Inspection of Personal Protective Equipment

All PPE ensemble components must be inspected before use and when in use within project work zones. Self-inspection and the use of the buddy system, once PPE is donned, will serve as the principal forms of inspection. If PPE should become damaged or degradation or permeation is suspected, the individual wearing the PPE will inform others of the problem and proceed directly to the work zone exit point to doff and replace the unserviceable PPE. In addition, all PPE that becomes grossly contaminated or presents a potential source for the spread of such contamination will be required to be decontaminated

or replaced. Table 5-3 provides an inspection checklist for common PPE items. Where specialized protective clothing or respiratory protection is used or required, the manufacturer's inspection requirements, in conjunction with regulatory or industry inspection practices, will be followed. Consult the project industrial hygienist, safety professional, and RCT about PPE inspection criteria.

6. PERSONNEL TRAINING

All ICP personnel will receive training, as specified in 29 CFR 1910.120, 29 CFR 1926.65, and ICP company-wide manuals as applicable. Table 6-1 summarizes the project-specific training requirements for personnel-based access requirements, responsibilities at the project site, potential hazards, and training level requirements.

Modifications (e.g., additions or eliminations) to training requirements listed in Table 6-1 may be necessary based on changing field conditions. Any changes to the requirements listed in Table 6-1 must be approved by the HSO, with concurrence from the FTL/STR, project manager, RCT, and industrial hygienist, as applicable. These changes should be based on site-specific conditions and will generally be considered a minor change to the HASP, as defined by instructions on Form 412.11, "Document Management Control Systems (DMCS) Document Action Request (DAR)," because they are administrative in nature.

6.1 General Training

All project personnel are responsible for meeting training requirements including applicable refresher training. Evidence of training will be maintained at the project site, field administrative location, or electronically (e.g., Training Records and Information Network [TRAIN] [http://train1.inel.gov/]). Nonfield team personnel and visitors must be able to provide evidence of meeting required training for the area of the site they wish to access before being allowed in. As a minimum, all personnel who access project locations must receive a site-specific briefing, are required to wear PPE, and must provide objective evidence of having completed INL computer-based PPE training (00TRN288, "Personal Protective Equipment") or equivalent, in accordance with 29 CFR 1910.132, "General requirements."

6.2 Project-Specific Training

Before beginning work at the project site, field team members will receive project-specific HASP training conducted by the HSO (or designee). This training will consist of a complete review of (1) the project HASP, attachments, and document action requests; (2) applicable JSAs, RWPs, and SWPs (if required); (3) work orders; and (4) other applicable work control and work authorization documents, with time for discussion and questions. Project-specific training can be conducted in conjunction with, or separate from, the required formal prejob briefing (MCP-3003).

At the time of project-specific HASP training, personnel training records will be checked and verified to be current and complete for all the training requirements shown in Table 6-1. Additional training may be required due to changed conditions or exposure risks (e.g., elevated sample results for beryllium, asbestos). After the HSO (or designee) has completed the site-specific training, personnel will sign Form 361.25, "Group Read and Sign Training Roster," or equivalent, indicating that they have received this training; understand the project tasks, associated hazards, and mitigations; and agree to follow all HASP and other applicable work control and safety requirements. Form 361.25 (or equivalent) training forms are available on the INL Intranet under "Forms."

Table 6-1. Required project-specific training.

Required Training	Subcontract Technical Representative, Field Team Leader, Health and Safety Officer	Samplers, Other Field Team Members	Access into the Designated or Controlled Work Area, or Contamination Reduction Zone	Visitor Access to Project Areas Outside Designated or Controlled Work Area, or Contamination Reduction Zone
40-hour hazardous waste operations (HAZWOPER) - operations	Yes[a]	Yes[a]	Yes[a,b]	
24-hour HAZWOPER - operations				Yes[a,b]
HAZWOPER supervisor	Yes[c]	c		
Project-specific health and safety plan briefing	Yes[d]	Yes[d]	Yes[d]	
Project-site orientation briefing				Yes[e]
INL Site access (blue card) or equivalent construction site access training (orange card)	Yes[f]	Yes[f]	Yes[f]	Yes[f]
Unexploded Ordinance Recognition Training (00TRN803)	Yes[f]	Yes[f]	Yes[f]	Yes[f]
Field Worker Point of Contact Training (00TRN1145)	Yes[c]	c		
JSA briefing	Yes	Yes	Yes	e
Prejob briefings and postjob reviews (00TRN732)	Yes	Yes	Yes	
Prejob briefing performance evaluation (00TRN754)	Yes[c]			
Use of PPE (00TRN288)	Yes	Yes	Yes	Yes
Noise awareness (SMTT0003)	g	g	g	g
Heat stress training (00TRN606)	Yes	Yes	Yes	e
Working in hazardous temperatures - cold stress (SMTT0010)	Yes	Yes	Yes	e
DOE Radiological Worker II/ Radiological Worker I/General Employee Radiological Training	Yes[h]	Yes[h]	Yes[h]	Yes[h]
Fire extinguisher training (00TRN126 or 00TRN232)	c	c		

Table 6-1. (continued).

Required Training	Subcontract Technical Representative, Field Team Leader, Health and Safety Officer	Samplers, Other Field Team Members	Access into the Designated or Controlled Work Area, or Contamination Reduction Zone	Visitor Access to Project Areas Outside Designated or Controlled Work Area, or Contamination Reduction Zone
Cardiopulmonary resuscitation, medic first-aid	c	c		
Respirator training (contingency only)	i	i		
Lead and cadmium awareness training	Yes[g]	Yes[g]	g	
Excavation competent person	c	c		
Industrial Ergonomics (00TRN838)	h	Yes		

Note 1: Shaded fields indicate specific training is not required or applicable.

Note 2: Supervised field experience is only required if personnel have not previously completed this training at another CERCLA (42 USC § 9601) site (documented) or they are upgrading from 24- to 40-hour HAZWOPER training. A copy of the training record must be kept at the project site as evidence of training or be available electronically.

Note 3: Completed training project forms (Form 361.47, or equivalent) should be submitted to the Idaho Closure Project training coordinator for inclusion in the Training Records and Information Network system within 5 working days of completion.

a. Includes 8-hour hazardous waste operations (HAZWOPER) refresher training annually and supervised field experience as follows: 40-hour HAZWOPER = 24-hour supervised field experience and 24-hour HAZWOPER = 8-hour supervised field experience).

b. 40-hour or 24-hour HAZWOPER training requirement will be determined by the HSO based on the nature of the project tasks and potential for exposure to contaminants or safety hazards.

c. At least one trained person onsite when field team is working and the health and safety officer will determine appropriate number of personnel requiring training.

d. Includes project-specific hazards communications (29 CFR 1910.120), site-access and security, decontamination and emergency response actions, as required by 29 CFR 1910.120(e).

e. Orientation includes briefing of site hazards, designated work areas, emergency response actions, and PPE requirements. Personnel receiving project-site orientation briefing only are limited to the areas outside designated work areas and must be escorted by a project supervisor or designee who is fully trained on the requirements of the health and safety plan.

f. Work locations outside a facility boundary require additional training including unexploded ordinance recognition training (00TRN803) briefing and site access training (blue or orange card).

g. Only if entering areas where initial exposure determination indicates exposure above the action limit is possible.

h. As required, based on project duties and/or site zone access requirements, escort requirements.

i. Only required if entering area requiring respiratory protection (e.g., action levels exceeded or the industrial hygienist sampling shows respirators required).

Personnel exposed to lead shall complete an appropriate level of training based upon the level of exposure and exposure frequency defined in Table 6-2.

Table 6-2. Training requirements for employees occupationally exposed to lead.

Level of Exposure	Training Required	Frequency
Incidental, works with solid lead, or exposure < action level on any day	Awareness Training (TRN 225)	Initial (prior to job assignment); when work coordinator or job supervisor determines that retraining or additional training is necessary
Exposure ≥ action level on any day OR works with lead compounds which may cause skin or eye irritation	Worker Training (TRN 35)	Initial (prior to job assignment); annually

Figure 6-1 identifies training requirements for entering or conducting work in CERCLA-regulated areas based on the potential for personnel exposure. A trained HAZWOPER 8-hour supervisor (HSO or other person who has been trained by the HAZWOPER supervisor) will monitor the performance of each newly 24- or 40-hour trained worker to meet the 1 or 3 days of supervised field experience, respectively, in accordance with 29 CFR 1910.120(e) or 29 CFR 1926.65(e). Following the supervised field experience period, the supervisor will complete Form 361.47, "HAZWOPER Supervised Field Experience Verification," or equivalent, to document the supervised field experience. Form 361.47 is also required for all project 24- or 40-hour trained personnel who do not have documentary evidence of completing the 1- or 3-day supervised field experience.

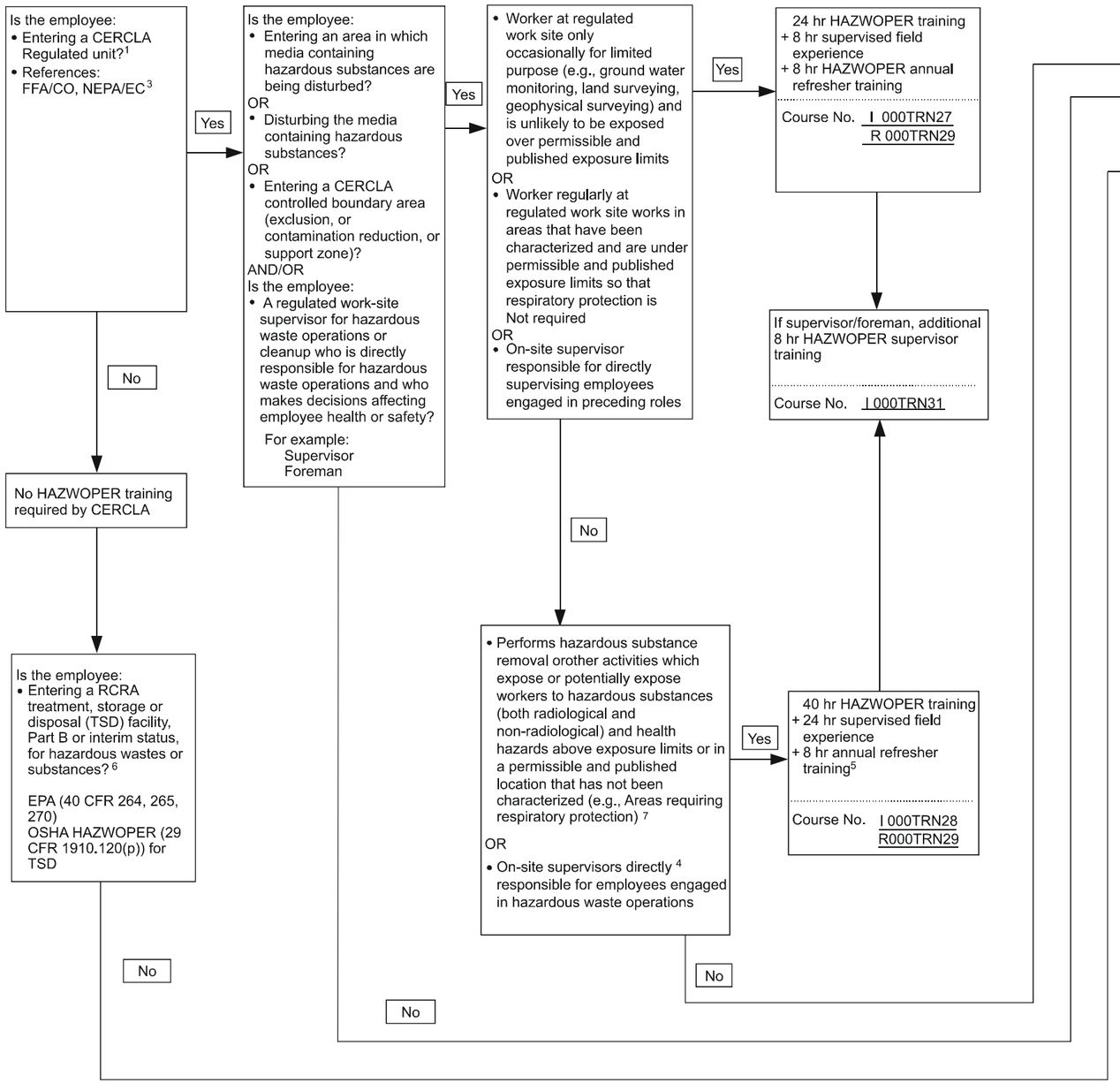
6.3 Prejob Briefings and Postjob Reviews

Formal prejob briefings and postjob reviews will be conducted as required in MCP-3003. Each individual tasked with conducting a prejob briefing or postjob review will be fully qualified in accordance with MCP-3003.

6.4 Plan-of-the-Day Briefing, Feedback, and Lessons Learned

A daily plan-of-the-day (POD) or equivalent meeting will be conducted by the FTL/STR or designee. During this meeting, daily tasks are to be outlined; hazards identified; hazard controls, mitigation, and work zones established; PPE requirements discussed; and feedback from personnel solicited. At the completion of this meeting, any new work control documents will be reviewed and signed (e.g., SWP, JSA, or RWP).

Particular emphasis will be placed on lessons learned from the previous workday's activities and how tasks can be completed in the safest, most efficient manner. All personnel are encouraged to contribute ideas to enhance worker safety and mitigate potential exposures at the project sites. This POD will be conducted as an informal meeting and the only required record will be to document the completion of the POD in the FTL logbook.



1 A CERCLA worker who also works on a RCRA/TSD site must also receive site-specific RCRA training and must be trained to the Health & Safety Plan (HASP) and receive orientation to the area.

2 A RCRA employee who also works on a CERCLA site will need additional training.

3 Contact Environmental Affairs Department

4 Comply with written HASP training requirements, if available.

5 16 hr upgrade needed for employees with 24 hr training, Course No. 000TRN69.

6 A RCRA employee who also works on a CERCLA site will need additional training if the CERCLA portion of the site is uncharacterized or requires use of a respirator.

7 Likely exposure indicated by:

A. Exposure to hazardous substances or health hazards which require the use of employee personal protective equipment to prevent acute, chronic, or adverse health effects (this applies to both radiological and nonradiological hazards)
OR

B. Airborne chemical exposures which meet or exceed established action levels or half the established exposure limits for chemicals which do not have assigned action levels.

Figure 6-1. Model identifying employees requiring HAZWOPER training at CERCLA sites.

Safety and health topic-specific training or safety meetings may also be conducted during the course of the project to reinforce key safety topics. They may be conducted by project safety and the industrial hygienist or any field team member and should be performed in conjunction with the POD. Credit for a safety meeting can be received for such topic-specific training if a tailgate training form (Form 361.24, “Tailgate Attendance Roster”) or equivalent is completed and submitted to the appropriate training coordinator for entry into TRAIN.

Note: If a formal MCP-3003 prejob briefing is conducted during the work shift, a POD is not required.

7. SITE CONTROL AND SECURITY

Site control and security will be maintained at the project site during all activities to prevent unauthorized personnel from entering the work area. Entry into and exit out of these areas will be controlled through the appropriate use of barriers, signs, and other measures in accordance with PRD-2022 or PRD-5117. All unauthorized entry shall be reported to the project HSO who will report this information directly to the project manager and INTEC shift supervisor.

The HSO shall be consulted regarding equipment layout at the project site (in conjunction with the subcontractor superintendent for subcontractor-owned equipment) to minimize personnel hazards from equipment. The focus should be on equipment with stored energy (electrical, pressurized systems, elevated materials/equipment, chemical), moving and rotating parts (equipment that is guarded and that has open rotating parts such as a drill rig), and other equipment with the potential to result in personnel injuries from being struck-by, caught-between, or entangled in such equipment. The layout at the project site of equipment should reflect the nature of the hazard presented and should be mitigated through the use of engineering controls (barriers, guards, isolation), administrative controls (roped off restricted areas or controlled entry access), and qualifications of operators and those assisting in the operation of the equipment, when required.

Good housekeeping will be maintained at all times during the course of the project to include maintaining working and walking surfaces to minimize tripping hazards, stacking or storing materials and equipment in a centralized location when not in use, and regular cleanup of debris and trash that may accumulate at the project site.

Based on the nature of the project tasks to be completed, a graded approach with two types of site control designations will be used based on the potential hazards, complexity of work tasks, and duration of project tasks. These are areas where the primary safety hazards have little to no chance of exceeding the action limits. The two types of work areas are

- Designated work areas (DWAs), established for low-hazard routine tasks (e.g., waste sampling and packaging)

- Controlled work areas (CWAs), established for higher hazard tasks (e.g., contaminated soil and material removal).

The primary differences between the work areas will be the size of the area, method of delineation, and postings as determined by the activity being conducted and associated hazards. The determination of what type of work area will be established will be made by the HSO in conjunction with the FTL/STR and RadCon personnel (where radiological concerns exist).

Those areas where the primary hazards will exceed action levels or limits shall have traditional HAZWOPER work control zones:

- Exclusion zone (EZ)

- Contamination reduction zone including a contamination reduction corridor (CRC) (the CRC may not be posted but is the primary pathway from the contamination reduction zone [CRZ] to the exclusion zone)

- Support zone.

Both radiological and nonradiological hazards (including industrial safety hazards) will be evaluated when establishing the initial work zone size, configuration, and location. Common barriers may be used to delineate both radiological and nonradiological work-zone postings, depending on the nature and extent of contamination. If common barriers are used, they will be delineated and posted in accordance with both sets of requirements (29 CFR 1910.120 and 10 CFR 835), using appropriate colored rope and postings.

Personnel not directly involved with project activities will be excluded from entering these work areas. Visitors may be admitted into work areas provided they (1) are on official business, (2) received site-specific training or orientation by the STR/HSO/FTL or designee, and (3) have met all the site-specific training requirements for the area they have a demonstrated need to access (including PPE training), as listed in Table 6-1. Visitors will not be allowed access until evidence of training is provided to the project STR/HSO/FTL personnel for verification.

Note: Visitors may not be allowed into controlled work areas during moderate to high hazard tasks, such as soil or material removal activities, to minimize risks to workers and visitors. The determination as to any visitor's need for access into the controlled work area will be made by the HSO in consultation with the IH and RCT (as appropriate).

Figure 7-1 illustrates an example of a DWA. The figure represents the general configuration of the work area and is not intended to provide an exact layout, position of equipment, or scale. Changing field activities, equipment, and IH or RadCon monitoring may warrant reconfiguring the layout, size, designation, and orientation of these work areas. Additionally, entrance and egress points may change based on these same factors. Changes, additions, or elimination of areas will be the decision of the FTL/STR, in conjunction with the HSO, RadCon (as appropriate), safety professional, and IH, based on monitoring data and the nature of the activities taking place. The DWA layout will be configured to provide effective hazard mitigation as a priority.

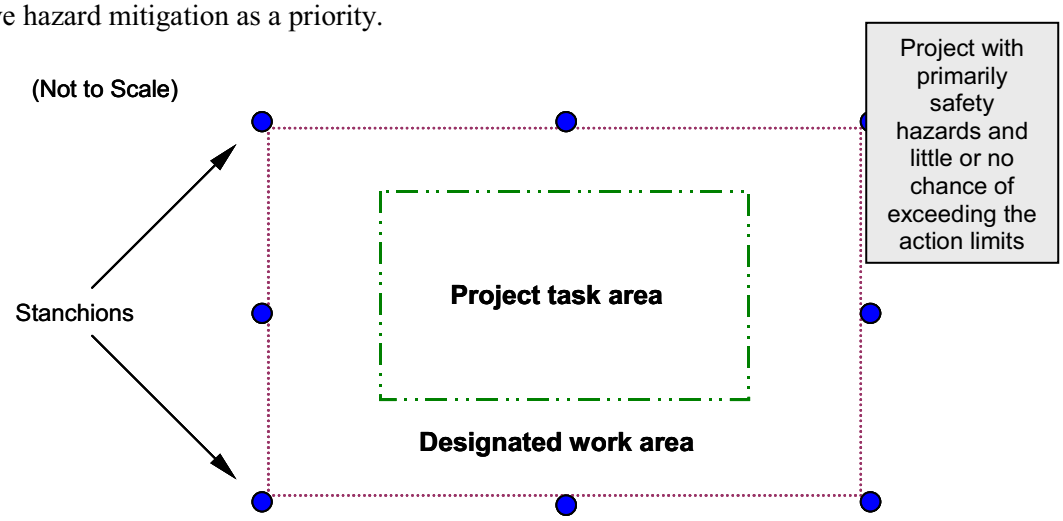


Figure 7-1. Example configuration for an OU 3-13, Group 3, designated work area.

All potential safety, chemical, and radiological hazards will be evaluated when delineating each work area location and size. Barriers (e.g., rope, cones, printed ribbon) will be used for delineation and demarcation. Where warranted, designated traffic routes may also be established. These areas also will be posted to prevent inadvertent entry by unauthorized personnel.

7.1 Designated Work Area

The DWAs established for waste packaging or sampling tasks will consist of the area immediately around the activity. This type of work area will be established where a more restrictive designated work area would not lend itself due to low-hazard sampling tasks of short duration. The boundary of the DWA will typically be marked with cones or stanchions and generally will not be delineated with rope or ribbon or include other demarcation. All personnel who enter the DWA will wear the appropriate level of PPE for the degree and type of hazards present, as listed in Section 5. All DWAs will be delineated and posted with the appropriate signage based on the hazard being controlled, in accordance with PRD-5117 or PRD-2022.

Support facilities and equipment (e.g., project administrative trailer, vehicle parking, additional emergency equipment, extra PPE, and stored monitoring and sampling equipment) will generally be located outside the DWA. Visitors who do not have appropriate training or PPE to access the DWA will be restricted from entering.

7.2 Controlled Work Area

The CWAs will be large enough to encompass the equipment and nature of the tasks being conducted and to prevent personnel not assigned to the project task and visitors from being exposed to potential safety and health hazards associated with the project tasks. This type of work area will be established where a more restrictive area is required based on increased hazards associated with contaminated soil or materials removal tasks. The boundary of the CWA typically will be marked with a combination of stanchions or posts and delineated with rope or ribbon and will include warning signs (e.g., CERCLA area) or other demarcation. Only the minimum number of personnel required to safely perform the project tasks will be allowed into the CWA. The CWA is a controlled area during all project tasks, and an entry and exit point will be established at the periphery of the CWA to regulate the flow of personnel and equipment. All personnel who enter the CWA will wear the appropriate level of PPE for the degree and type of hazards present, as listed in Section 5.

Factors that will be considered when establishing the CWA boundary include (1) air monitoring data, (2) equipment in use, and (3) the physical area necessary to conduct site operations. The boundary may be expanded or contracted as this information becomes available, based on the aforementioned factors. The HSO, in conjunction with the safety professional and industrial hygienist, will establish the CWAs. All CWAs will be delineated and posted with the appropriate signage based on the hazard being controlled in accordance with PRD-5117 or PRD-2022.

Note: The safety professional and industrial hygienist will assist the HSO in establishing the access requirements for the truck or heavy equipment traffic routes, designated work areas, and project-based equipment in use.

7.3 Truck and Heavy Equipment Traffic Routes

Truck and heavy equipment traffic routes may be established for trucks entering OU 3-13, Group 3 work sites, based on project activities. If established, these routes will include a turnaround area where feasible and should be delineated with cones or equivalent markers if an existing roadway does not exist. All drivers will be instructed to use these traffic routes when entering and leaving the OU 3-13, Group 3

work areas and worker entry or crossing restrictions should be in effect when truck or equipment traffic is using the routes, except at designated crossing points.

7.4 Exclusion Zone

The exclusion zone will be large enough to encompass the primary task area (e.g., contaminated soil removal or buried compressed gas cylinder removal) and to allow equipment and personnel to move about freely and conduct necessary tasks. The minimum number of personnel required to safely perform project tasks will be allowed into the exclusion zone. If the exclusion zone will be relocated to another site or reconfigured, it will be delineated in a configuration large enough to prevent nonfield team personnel in the support zone from being exposed to potential safety and health hazards. The exclusion zone shape and size will be based on the tasks being conducted, existing structures and facilities, and potential for impact to adjacent areas from project tasks or contaminants.

The exclusion zone is a controlled access zone at all times. An entry and exit point will be established at the periphery of the exclusion zone and CRC to regulate the flow of personnel and equipment. The exclusion zone boundary will be delineated with rope or printed hazard ribbon and posted with signs in accordance with PRD-5117 or PRD-2022.

Factors that will be considered when establishing the exclusion zone boundary include (1) tasks being conducted, (2) air monitoring data, (3) radiological contamination data, (4) radiation fields, (5) equipment in use, (6) the physical area necessary to conduct site operations, and (7) the potential for contaminants to be blown from the area. The boundary may be expanded or contracted as these factors change or additional monitoring information becomes available. All personnel who enter the exclusion zone will wear the appropriate level of PPE for the hazards present and have required training as listed in Sections 5 and 6 of this HASP, respectively.

The HSO, in conjunction with the project IH and/or RCT (for radiological issues) and with the concurrence of the industrial hygienist or RadCon, may upgrade or downgrade OU 3-13, Group 3 sites should monitoring data indicate action levels or limits will or will not be exceeded.

7.5 Contamination Reduction Zone and Corridor

The CRZ and CRC are transition areas surrounding the exclusion zone and are located between the exclusion zone and support zone (Figure 7-2). The CRC may not be formally delineated but will be designated by the travel path from the established CRZ-controlled entry and exit point and the exclusion zone entry and exit point. The CRZ and CRC will serve to buffer the support zone from potentially contaminated exclusion zone areas. The CRZ and CRC may serve as staging areas for equipment and temporary rest areas for personnel.

7.6 Support Zone

The support zone will be considered a “clean” area. The location of the support zone will be in a prevailing upwind direction from the exclusion zone (where possible) and readily accessible from the nearest road. The support zone is a designated area or building outside the CRZ and does not have to be delineated. Support trailers, vehicle parking, additional emergency equipment, extra PPE, and stored monitoring and sampling equipment may be located in the support zone. Visitors shall have appropriate training to enter the support zone and any other project areas. Visitors without appropriate training will be restricted from the project support zone.

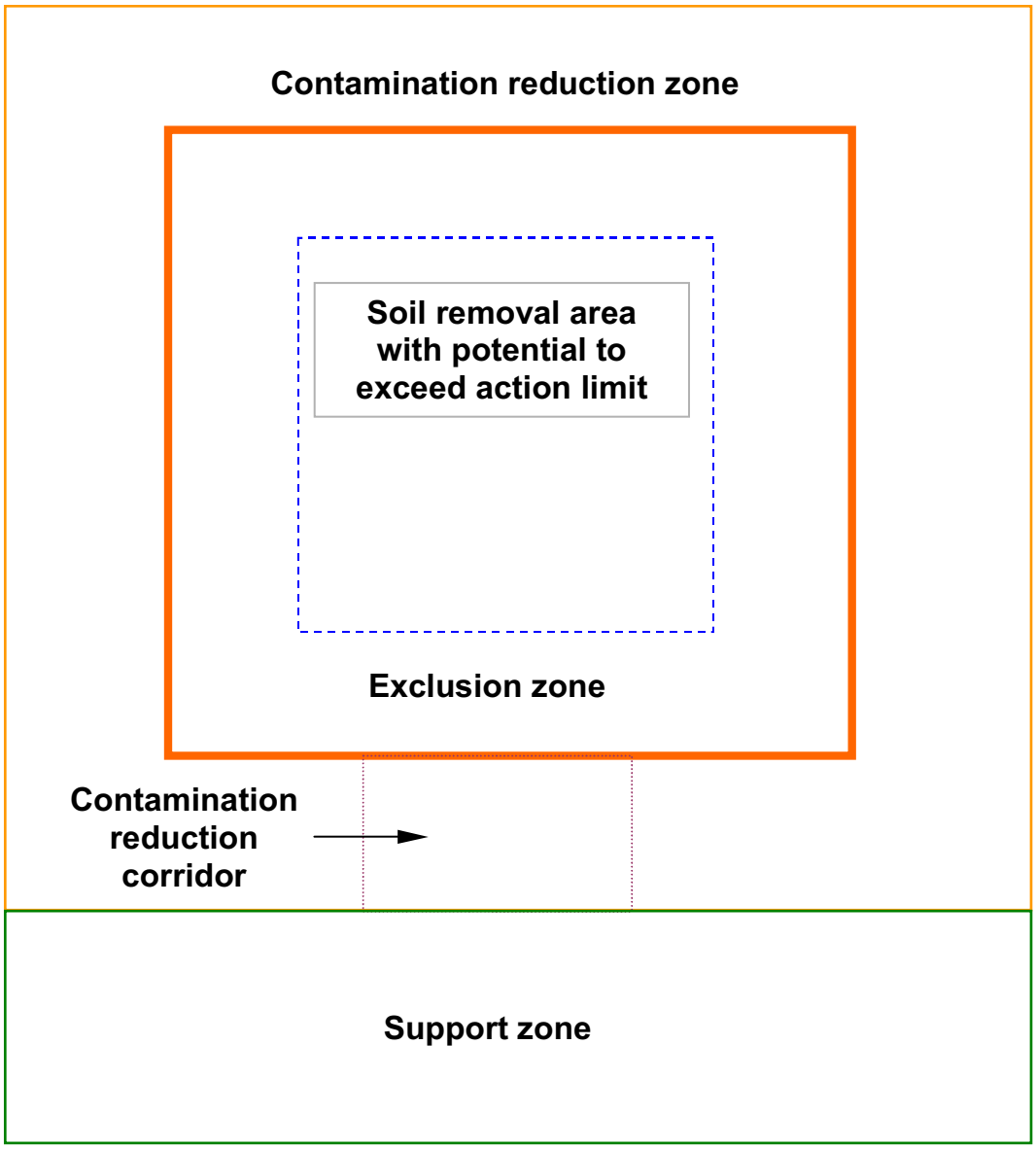


Figure 7-2. General HAZWOPER work zones.

7.7 Radiological Control and Release of Materials

Potentially radiologically contaminated items or equipment will not be released until required radiological surveys have been completed (e.g., hand-held instruments and swipes) in accordance with MCP-139, "Radiological Surveys"; MCP-425, "Radiological Release Surveys, and the Disposition of Contaminated Materials"; as stated in the RWP; and as directed by RadCon personnel.

7.8 Site Security

All OU 3-13, Group 3 project sites will be secured and controlled during normal work hours as described in the previous sections. During nonworking hours, the general project sites located inside ICP facilities are controlled by the facility fence and normal security access requirements. However, additional project site security and control will be required to prevent unauthorized personnel from

entering the project area and being exposed to potential safety or health hazards. This will be accomplished by delineating project areas with rope boundaries and posting where hazards are left unmitigated (e.g., open trenches, exposed contaminated soils, or equipment left onsite). Signage will be left in place during off-hours and weekends to prevent personnel from inadvertently entering the area.

The FTL/STR has the primary responsibility for ensuring that the project area is secured. The project HSO and RadCon (where required) will ensure that all health and safety and radiological postings of the area are intact when leaving the site and will be responsible for maintaining them for the duration of the project. Project personnel are trained about site access and control requirements during project-specific HASP training and will not cross roped areas without the proper training and authorization, regardless of whether a sign is in place.

Note: Signs are routinely lost because of high winds and will be replaced as soon as possible the next working day following discovery.

7.9 Wash Facilities and Designated Eating Areas

Ingestion of hazardous substances is possible when workers do not practice good personal hygiene habits. It is important to wash hands, face, and other exposed skin thoroughly after completion of work and before smoking, eating, drinking, and chewing gum or tobacco. For project personnel, the designated washing facilities and eating areas will be established before work begins at an OU 3-13, Group 3 site.

7.10 Designated Smoking Area

Smoking will only be permitted in compliance with company policies and procedures. Personnel will comply with all such polices including disposing of smoking materials in the proper receptacle. Smoking is only permitted in nonwork areas. The project HSO, in consultation with the designated fire protection engineer, will be the single point of contact for establishing any smoking area outside facilities, and such areas may not be permitted at certain times of the year because of high or extreme fire danger.

8. OCCUPATIONAL MEDICAL SURVEILLANCE

Work-site personnel will participate in the ICP occupational medical surveillance program (or equivalent subcontractor program), as required by DOE Order 440.1, "Worker Protection Management for DOE Federal and Contractor Employees," and 29 CFR 1910.120. Medical surveillance examinations will be provided before assignment, annually, and after termination of HAZWOPER duties or employment. This includes the following employees:

- Personnel who are, or may be, exposed to hazardous substances at or above the OSHA permissible exposure limit (PEL), or published exposure limits, without regard to respirator use for 30 or more days per year

- All employees who are injured, become ill, or develop signs or symptoms because of possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation

- All employees who wear a respirator for 30 days or more a year or as required by "Respiratory Protection" (29 CFR 1910.134).

Personnel who wear a respirator in performance of their job or who are required to take respirator training to perform their duties under this plan must participate in the medical evaluation program for respirator use at least annually, as required by PRD-2109 or MCP-2726, "Respiratory Protection."

A single copy of the project HASP, job hazard analysis requirements, required PPE, confined space entry requirements (as applicable), and other exposure-related information will be made available, upon request, to the ICP OMP physician (and subcontractor physicians) conducting medical surveillance for employees participating in this project. Exposure monitoring results and hazard information furnished to the OMP physician will be supplemented or updated annually (as stated in Section 12) as long as the employee is required to maintain a hazardous waste and material employee medical clearance. The OMP physician will then evaluate the physical ability of an employee to perform the work assigned.

A documented medical clearance (e.g., a physician's written opinion) will be provided to the employee and line management stating whether the employee has any detected medical condition that would place him or her at increased risk of health impairment from working in hazardous waste operations, emergency response operations, respirator use areas, and confined space areas, as applicable. The physician may impose restrictions on the employee by limiting the amount and type of work performed.

Personnel are responsible for communicating any work or medical restrictions to their supervisor so modified work assignments can be made if necessary. During the MCP-3003 prejob briefing, the supervisor conducting the briefing should ask workers if they have any work restrictions. However, it is the employee's responsibility to inform the supervisor of any work or medical restrictions.

8.1 Subcontractor Workers

Subcontractor project personnel will participate in a subcontractor medical surveillance program that satisfies the applicable requirements of 29 CFR 1910.120 or 29 CFR 1926.65. This program must make medical examinations available before assignment, annually, and after termination of hazardous waste duties as stated above. The physician's written opinion, as defined by 29 CFR 1910.120(f)(7) (or equivalent), will serve as documentation that subcontractor personnel are fit for duty or will list work restrictions.

Medical data from the subcontractor employee's private physician, collected pursuant to hazardous material worker qualification, will be made available to the ICP OMP physicians on request.

8.2 Injuries on the Site

It is the policy of the ICP that an ICP OMP physician examine the following personnel:

- An employee injured on the job
- An employee experiencing signs and symptoms consistent with exposure to a hazardous material
- An employee believed to have been exposed to toxic substances or physical or radiological agents in excess of allowable limits during the course of a project at the INL.

Note: In the event of an illness or injury, the decision to provide first aid and transport to the nearest medical facility or whether to immediately request an ambulance and continue to stabilize and provide first aid should be based on the nature of the injury or illness and likelihood that transporting the individual may cause further injury or harm. Most likely, the person making this decision will only be trained to the medic first/CPR level and should contact the CFA medical facility at 777 or 526-1515 for further guidance if there is any question as to the extent of injury or potential to cause further harm by movement of the injured individual.

In the event of a known or suspected injury or illness caused by exposure to a hazardous substance or physical or radiological agent, the employee will be transported to the nearest INL medical facility for evaluation and treatment, as necessary. The HSO and FTL/STR are responsible for obtaining as much of the following information as is available and the HSO shall accompany the individual to the medical facility with the following:

- Name, job title, work (site) location, and supervisor's name and phone number
- Substance, physical or radiological agent exposed to (known or suspected), and material safety data sheet, if available
- Nature of the incident and injury or exposure and associated signs or symptoms of exposure
- First aid or other measures taken
- Locations, dates, and results of any relevant personal or area exposure monitoring or sampling
- List of PPE worn during this work (e.g., type of respirator and cartridge used).

Further medical evaluation will be determined by the treating or examining physician in accordance with the signs and symptoms observed, hazard involved, exposure level, and specific medical surveillance requirements established by the OMP director in compliance with 29 CFR 1910.120.

Note: In the event of an illness or injury, subcontractor employees will be taken to the closest INL medical facility (CFA), if doing so will not cause further injury or harm, or be transported by INL ambulance to have an injury stabilized before transport to the subcontractor's treating physician or off-Site medical facility.

The OU 3-13, Group 3 project manager and health and safety officer will be contacted immediately if any injury or illness occurs at a project site. The STR/FTL/HSO shall secure the accident scene in a safe manner to prevent evidence disturbance. As soon as possible after an injured employee has been transported to the INL medical facility, the STR/FTL or designee will make notifications as indicated in Section 10. The HSO will accompany the injured personnel to the INL Medical Facility. The accident investigation will be conducted by project personnel, as directed by the project manager and project HSO, in addition to the employee work organization management who is ultimately responsible for ensuring an internal investigation is performed.

8.3 Substance-Specific Medical Surveillance

No substance-specific medical surveillance protocols are required at this time. If new contaminants of concern are identified, and as potential exposure to known contaminants is quantified as required in Section 3, the project IH will determine applicable substance-specific medical surveillance protocols. If regulatory-mandated substance-specific standard action levels are triggered, then affected personnel will be enrolled in applicable substance-specific medical surveillance programs.

9. KEY SITE PERSONNEL RESPONSIBILITIES

The organizational structure for this project reflects the resources and expertise required to perform the work while minimizing risks to worker health and safety, the environment, and the public. Key project positions, lines of responsibility, and communication are shown on the organization chart for the site (see Figure 9-1). This organization chart is not all-inclusive but shows the structure for key resources assigned to complete project tasks. The Clean/Close program management plan (PMP) and Clean/Close project-specific project execution plan (PEP) details roles and responsibilities for program personnel above the project manager level. Section 9.1 outlines the responsibilities of key site personnel.

9.1 Work Site Responsibilities

9.1.1 Field Team Leader

The FTL represents the ICP organization at project site(s) with delegated responsibility for the safe and successful completion of the project tasks. The FTL will manage tasks and execute the applicable field sampling plans, TPRs, and other project-specific documents. The FTL may serve as the sampling FTL for all routine monitoring tasks and may temporarily serve as the HSO based on the qualifications and complexity of the activities. Additional responsibilities include, but are not limited to, the following:

- Maintain a record of daily site events in the **FTL logbook** and maintain accurate records of all personnel (e.g., workers and nonworkers) who are onsite each day in a **site attendance logbook**. Logbooks must be obtained from the field data coordinator for the ICP Sample and Analysis Management.

- Ensuring that all field sampling activities are conducted in compliance with TPRs, work orders, and associated ISMS requirements

- Obtaining and coordinating all resources needed to implement the field sampling work including equipment, labor, and administrative and technical permits and approvals

- Coordinating with the facility interface to schedule routine monitoring tasks through the facility POD.

If the FTL leaves the site, an alternate individual will be appointed and that information is communicated to all field personnel. Persons acting as FTL must meet all the FTL training requirements outlined in Section 6.

9.1.2 Health and Safety Officer

The HSO is the person assigned to the work site who serves as the primary contact for all health and safety issues. The HSO advises the FTL/STR on all aspects of health and safety and is authorized to stop work at the work site if any operation threatens worker or public health or safety. The HSO is authorized to verify compliance to the HASP, conduct inspections and self-assessments, require and monitor corrective actions, and monitor decontamination procedures as appropriate. The CWI-assigned safety and health professional(s) at the task site (e.g., safety professional, industrial hygienist,) provide project oversight. Qualified subcontractor occupational health and safety (OSH) representatives may perform on-site HSO duties when authorized through the procurement process by the subcontractor line of authority form (PROC 2121).

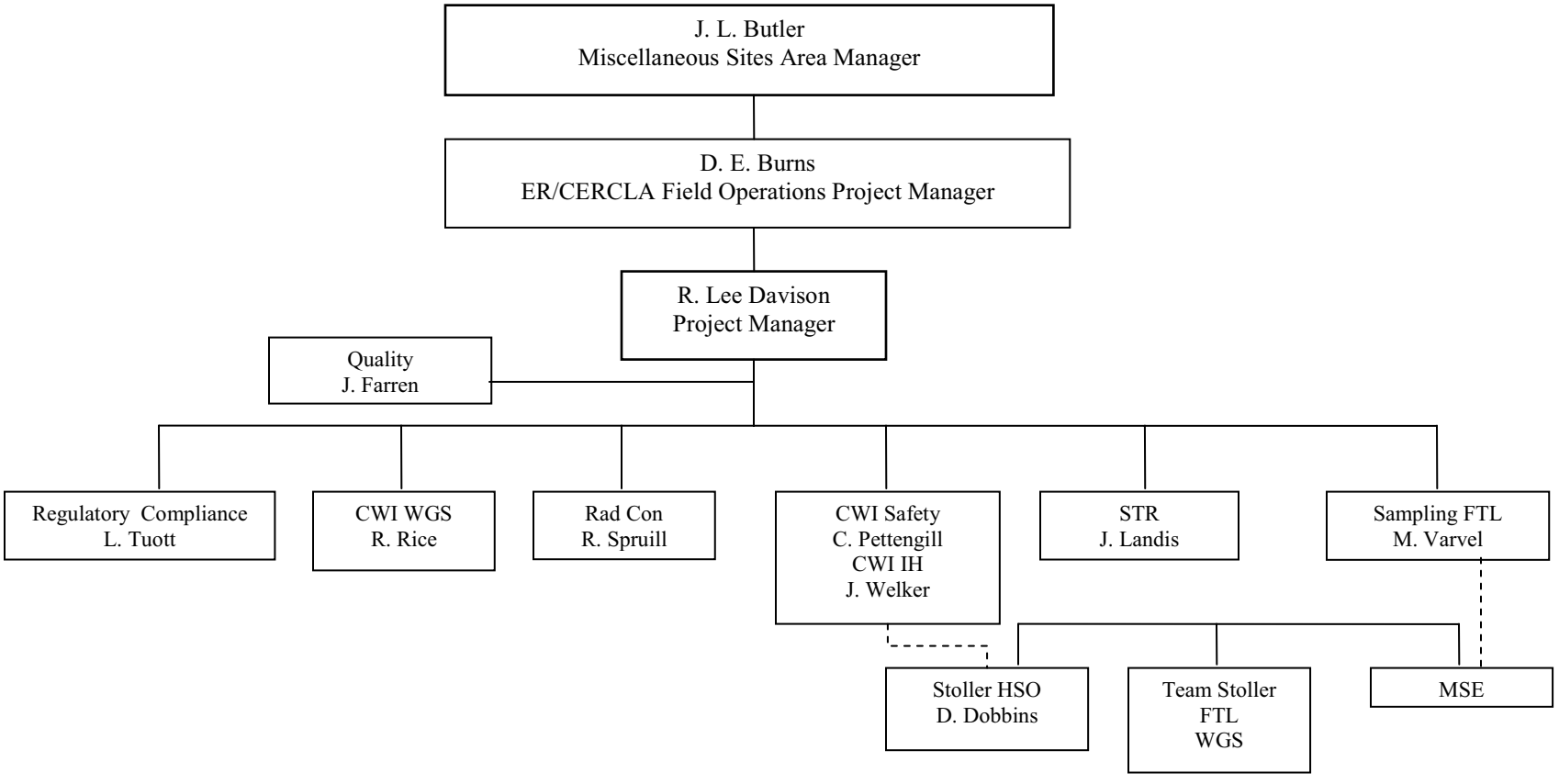


Figure 9-1. OU 3-13, Group 3, Other Surface Soils, remediation project organization chart.

Persons assigned as the HSO or alternate HSO must be qualified (in accordance with the definition in 29 CFR 1910.120) to recognize and evaluate hazards and will be given the authority to take or direct actions to ensure that workers are protected. A subcontractor HSO must have completed an OSHA 30-hour course; possess the 8-hour HAZWOPER Supervisor Qualification; and typically have 2 years of safety and health related experience in positions where OSH responsibilities comprised at least 50% of their time. Based on project size, complexity, and risk, the CWI safety engineer may change additional training/qualification requirements for the HSO in the project special conditions for subcontracts.

Other work-site responsibilities of the HSO must not interfere with the primary role of the HSO at the work site. If it is necessary for the HSO to leave the site, an alternate individual will be appointed by the HSO to fulfill this role and that person's identity will be communicated to project personnel and documented in the FTL logbook prior to the HSO leaving. Upon return, the HSO shall resume duties and it shall be noted in the FTL logbook.

9.1.3 Subcontractor Technical Representative

The STR is the individual representing remedial design/remedial action management at the site, with ultimate responsibility for the safe and successful completion of assigned project tasks. The STR manages field operations and executes the work plan, enforces site controls and documents work-site activities, and may conduct the daily POD briefing at the start of the shift. All health and safety issues at the work site must be brought to the STR's attention. The STR also will serve as the primary area warden during the project.

Persons acting as STR on the project site must meet all STR training requirements outlined in Section 6 of the project HASP. The identity of the acting STR will be conveyed to work-site personnel, recorded in the daily force reports, and communicated to the facility representative when appropriate.

If the nature of the field work requires involvement of field team staffing by equipment operators, laborers, or other crafts, a representative from the organization supplying these additional resources interfaces with the STR to provide work supervision. This person may be designated the job site supervisor (JSS).

9.1.4 Industrial Hygienist

The assigned industrial hygienist is the primary source for information about exposure assessments for the project chemical, physical, and biological hazards at the work site. The industrial hygienist assesses the potential for worker exposures to hazardous agents in accordance with companywide safety and health manuals, MCPs, and industry-accepted industrial hygiene practices and protocol. By participating in project planning, the industrial hygienist assesses and recommends appropriate hazard controls for the protection of site personnel, operates and maintains airborne sampling and monitoring equipment, reviews engineering controls for effectiveness, and recommends and assesses the use of PPE as required in this HASP (recommending changes as appropriate).

Personnel showing health effects (i.e., signs and symptoms) resulting from possible exposure to hazardous agents will be referred to an OMP physician by the industrial hygienist, supervisor, or HSO. The industrial hygienist may have other duties at the site as specified in other sections of this HASP or in PRDs or MCPs.

9.1.5 Safety Professional

The assigned safety professional reviews work packages, observes site activity, assesses compliance with the companywide safety and health manuals, advises the HSO on required safety equipment, and recommends solutions to safety issues and concerns that arise at the work site. The safety professional may conduct periodic inspections in accordance with MCP-3449 and may have other duties at the work site as specified in other sections of this HASP or in PRDs and MCPs. Copies of any safety and health inspections will be kept in the project field file.

9.1.6 Radiological Engineer

The radiological engineer is the primary source for information and guidance relative to the evaluation and control of radioactive hazards at OU 3-13, Group 3 sites. If a radiological hazard exists or occurs at a Group 3 site, the radiological engineer makes recommendations to minimize health and safety risks to site personnel. Responsibilities of the radiological engineer include

- Performing radiation exposure estimates and ALARA evaluations
- Identifying the type(s) of radiological monitoring equipment necessary for the work
- Advising the HSO and RCT of changes in monitoring or PPE
- Advising personnel on site evacuation and reentry.

The radiological engineer may also have other duties to perform as specified in other sections of this HASP or in accordance with companywide Manual 15B, "Radiation Protection Procedures."

9.1.7 Radiological Control Technician (as applicable)

The assigned RCT is the primary source for information and guidance on radiological hazards that may be encountered during project tasks and controls necessary to mitigate them. Responsibilities of the RCT include the following:

- Performing radiological surveying of the site, equipment, and samples
- Providing guidance for radioactive decontamination of equipment and personnel
- Accompanying the affected personnel to the nearest INL medical facility for evaluation if significant radionuclide contamination occurs.

The RCT must notify the FTL/STR and HSO of any radiological occurrence that must be reported, as directed by the INL Radiological Control Manual (PRD-183).

9.1.8 Fire Protection Engineer

The assigned fire protection engineer is available to provide technical guidance to the HSO and FTL about all fire protection issues and may be assigned to review the work packages and conduct preoperational and operational fire hazard assessments. The INL fire department also may need to be advised of fuel storage areas (if required) and will provide authorization for all hot work operations performed at the project site during times of high-to-extreme fire danger. The fire protection engineer is

required to sign all safe work permits used as hot (radiological) work permits within the jurisdiction of the facility site area director (SAD).

9.1.9 Sampling Team (as applicable)

The sampling team, if appointed, will consist of the FTL and support personnel including subcontract personnel and is responsible for the collection, preservation, and shipping of all routine monitoring samples in accordance with the applicable field sampling plan and TPRs. The industrial hygienist and safety professional will support the sampling team, as required, based on site-specific hazards and task evolutions. The sampling team will be led by a sampling FTL who also may perform other roles during the project. Bulk waste sampling is not anticipated on OU 3-13, Group 3 Other Surface Soils, remediation sites.

9.1.10 Specialty Subcontractors

Specialty subcontractors may be used to support equipment maintenance or waste stream characterization, handling, and shipping. A subcontractor lead will serve as the single point of contact for all subcontractor communication at the site and will report to the FTL/STR for all technical direction and interface issues at the project site. Subcontractor personnel will report any health and safety issues that arise to the FTL/STR or HSO and may stop work if an unsafe condition exists. The subcontractor lead also will be asked to provide hazard and mitigation information about the nature of their equipment or operations during the POD meeting and may participate in job-site hazard walkdowns where appropriate.

9.1.11 Field Team Personnel

All field team personnel, including facility and subcontractor support personnel assigned to the project, will understand and comply with the requirements of this HASP. The FTL/STR (or designee) will conduct a formal prejob briefing or POD at the start of each shift. During the POD briefing, all daily tasks, associated hazards, hazard mitigation (e.g., engineering and administrative controls, required PPE, and work control documents), and emergency conditions and actions will be discussed. Input from the project HSO, industrial hygienist, and safety personnel (where assigned) will be provided to clarify task health and safety requirements as deemed appropriate. All project personnel are encouraged to ask questions about site tasks and provide suggestions on ways to perform required tasks in a more safe and effective manner based on the lessons learned from previous routine monitoring activities.

Once at the project site, field team personnel are responsible for identifying any potentially unsafe situations or conditions to the FTL/STR or HSO for corrective action.

Note: If it is perceived that an unsafe condition poses an imminent danger, site personnel are authorized to stop work immediately and notify the FTL/STR or HSO of the unsafe condition.

9.1.12 Nonfield Team Personnel

All persons who may be at a project site and are not part of the field team (e.g., surveyors or others not assigned a field team support role) are considered nonfield team personnel as defined by this HASP. A person will be considered onsite when they are present in the support zone, designated work areas, or controlled work areas.

Nonfield team personnel are considered occasional site workers in accordance with the HAZWOPER and must receive site-specific HASP training in addition to 24-hour HAZWOPER training, and required training outlined in Table 6-1 at a minimum, before entering work areas at the project site. A site supervisor (e.g., HSO or FTL/STR) will supervise nonfield team personnel who have not completed their 3 days of supervised field experience in accordance with the HAZWOPER requirements.

9.1.13 Visitors

All visitors with official business at the project site (including ICP personnel, representatives of DOE, and state or federal regulatory agencies) may only proceed beyond the support zone after meeting the following requirements:

- Receive site-specific HASP training or hazard briefing based on specific tasks taking place
- Sign a HASP training roster and providing proof of having met all training requirements specified in Section 6 (or required access training for the area to be visited when project tasks are not being conducted)
- Participate in a prejob briefing in accordance with MCP-3003
- Provide objective evidence of PPE, training, and wearing the appropriate PPE for the area of the site to be accessed (29 CFR 1910.132).

If there is no potential for exposure to chemical, radiological, or safety hazards (e.g., down time) a visitor may be escorted at the project site after receiving a site orientation consisting of

- An overview of the controlled areas at the site and access restrictions
- Potential general site hazards and mitigation
- Required PPE for entry to the site (must be trained to wear required PPE)
- Emergency action to take in case of a take-cover or evacuation alarm.

Note: Visitors will not be allowed into controlled work areas (even with proper training) during active soil removal activities, soil transport operations, and hoisting operations to minimize the risk of injury or exposure. The determination as to any visitor's need for access into the controlled work areas during such tasks will be made by the FTL/HSO in consultation with the project RCT as appropriate.

A fully trained work-site representative (e.g., FTL/STR or HSO, or a designated alternate) will escort visitors when entering controlled areas of the project site, as site conditions warrant, and as deemed appropriate by the FTL/STR/HSO.

A casual visitor to the work site is a person who does not have a specific task to perform or other official business to conduct at the project site. Casual visitors are not permitted in work zones or designated work areas at any project site.

9.2 Facility Responsibilities

9.2.1 Facility Work Authorization

The facility director is responsible for all operational activities at the facility and must be cognizant of work being conducted in the facility. The Group 3 project manager is responsible for evaluating all activities with respect to the OU 3-13, Group 3, safety authorization and for approving all work packages and JSAs. The Group 3 project manager will be kept informed of the project status through the construction coordinator and task leader, and the facility POD for activities performed at the INTEC.

All activities will be scheduled through the facility as well as through work packages and procedures and will be opened daily as required. The FTL/STR (or designee) will provide authorization (i.e., signature on work order or TPR) to initiate daily activities.

9.3 Project Management Team

The Project Management Team (PMT) is responsible for the development and management of the project and the coordination of project operations. The PMT ensures that (a) operations, Federal Facility Agreement and Consent Order (DOE-ID 1991) compliance support, surveillance, and monitoring activities are conducted in accordance with INL applicable MCPs and PRDs, all applicable requirements (OSHA, U.S. Environmental Protection Agency, DOE, U.S. Department of Transportation, and State of Idaho) and (b) tasks comply with PLN-694, "Project Execution Plan for the Balance of INEEL Cleanup Project," and this HASP. The PMT is responsible for the overall work scope, schedule, and budget for this project.

10. EMERGENCY RESPONSE PLAN

This emergency response plan defines the roles and responsibilities of project personnel during an emergency. Such an emergency could be at the project site, on a tenant facility or collocated facility, or a Site-wide emergency. This section provides details of the ICP Emergency Response Organization (ERO) and PLN-114, "INEEL Emergency Plan RCRA Contingency Plan," information. PLN-114 describes the overall process developed to respond to and mitigate consequences of emergencies that might arise at the INEEL.

PLN-114 may be activated in response to events occurring at the project site, at the INL, or at the discretion of the emergency coordinator or emergency action manager. Once the INL plan is activated, project personnel will follow the direction and guidance communicated by the emergency coordinator.

Note: The OSHA HAZWOPER definition of an emergency is not the same as the one in DOE Orders 151.1A, "Comprehensive Emergency Management System," and 231.1A, "Environment, Safety, and Health Reporting." For this reason, the term "event" will be used in this section when referring to project HAZWOPER emergencies.

10.1 Preemergency Planning

PLN-114 provides the basis for preplanning all INL emergency events. This base plan is supplemented with INL facility-specific addenda. This preplanning makes it possible for the project to anticipate and appropriately respond to abnormal events that can affect project activity. Preplanning also ensures that the project emergency response program is integrated with that of the INL. Specific procedures for addressing emergency events and actions to be taken are further described in the facility-specific emergency implementing procedures. Finally, the HASP addresses project-specific hazards, potential emergency events, and the actions to take following such events.

10.2 Emergency Preparation and Recognition

The sections for hazard identification and mitigation and for accident prevention provided the strategy that will be followed at the project site to prevent accidents. Similarly, emergency preparation and recognition also will require project personnel to be constantly alert for potentially hazardous situations and signs and symptoms of chemical exposure or releases. All field personnel should be familiar with the techniques for hazard recognition, the assigned action levels, and associated actions to be taken as identified in Section 3.

MCP-2725, "Field Work at the INEEL," requirements for training, emergency actions, and notifications will be followed for all projects conducted outside facility boundaries.

Preparation and training for emergencies will include proper site access and egress procedures in response to project events and INL emergencies as part of the project-specific HASP training and facility access training where applicable. Visitors also will receive this training on a graded approach based on their site access requirements. Visitor training will include alarm identification, location and use of communication equipment, location of site emergency equipment, and evacuation. Emergency phone numbers and evacuation route maps will be located in the project trailer.

On-scene response to and mitigation of site emergencies could require response from both project personnel and INL fire department personnel. Emergencies could include the following scenarios:

- Accidents resulting in injury
- Fires
- Spills of hazardous or radiological materials
- Tornadoes, earthquakes, or other adverse natural phenomena
- Vehicle or transportation emergencies
- Safeguard and security emergencies
- Emergencies at nearby facilities that could prompt evacuation or take-cover actions at the work site.

10.3 Emergency Alerting, Responses, and Sheltering

10.3.1 Alarms

Alarms and signals are used at the project site and the INL to notify personnel of abnormal conditions that require a specific response. Responses to these alarms are addressed in general employee training. Emergency sirens located throughout the INL serve as the primary means for signaling emergency TAKE COVER or EVACUATION protective actions. To signal site personnel of a project-initiated emergency event, a separate set of emergency signals has been established based on horn blasts (e.g., vehicle or air horn).

Depending on the field location (within or outside a facility), facility alarms may not be able to be heard at the project site. If the project site is outside the audible range of the facility alarms, then the notification to take cover or evacuate should be received on the field radio. The project signals will then be used to alert personnel of the emergency actions.

10.3.1.1 Take Cover—Continuous Siren. Radiation or hazardous material releases, adverse weather conditions, or other event or emergency conditions may require that all personnel take cover indoors in the nearest building. A TAKE COVER protective action may be initiated as part of a broader response to an emergency situation and may precede an evacuation order. The order to TAKE COVER is usually announced by activating the emergency siren. The signal to take cover is a CONTINUOUS SIREN.

STEADY = STAY

However, the order to take cover also can be given by word of mouth, radio, or voice paging system. When ordered to TAKE COVER, project personnel will place the site and equipment in a safe configuration (as appropriate) and then seek shelter in the project trailer or vehicle (if outside the facility). Eating, drinking, and smoking are not permitted during take-cover conditions.

10.3.1.2 Total Area Evacuation—Alternating Siren. A total area evacuation is the complete withdrawal of personnel from the project site and the entire facility area. The evacuation signal is an ALTERNATING SIREN. When ordered to EVACUATE, project personnel will place equipment and the site in a safe configuration (as appropriate) and then proceed along the specified evacuation route to the designated assembly area or as directed by the emergency coordinator.

ALTERNATE = EVACUATE

For total area evacuations, the facility command post is activated and all personnel will gather at the primary facility evacuation assembly area or the location designated by the EC or FTL/STR if outside a facility. The FTL/STR or trained alternate will then complete the personnel accountability using the attendance log. In this situation, the project area warden will report the result of the accountability process to the facility emergency coordinator.

In the event of a total area evacuation, all traffic on the haul route will go to the nearest vehicle/equipment staging area. Drivers and equipment operators will safely park their vehicles and proceed as directed by the FTL, STR, or HSO.

10.3.1.3 Local Area Evacuation—Vehicle Horn Blast. A local area evacuation is the complete withdrawal of personnel from the project site, but it does not require the complete evacuation of the entire facility or INL area. A single long horn blast (e.g., vehicle) will serve as the project's primary emergency evacuation signal (as listed on Table 10-1). However, the order to evacuate also can be given by word of mouth, radio, or voice paging system. When ordered to evacuate the project site, personnel will place the site in a safe condition (as appropriate) and then proceed along the specified evacuation route to the assembly area designated for local area evacuations or as directed by the FTL/STR. Eating, drinking, and smoking are not permitted during emergency evacuations.

10.4 Personnel Roles, Lines of Authority, and Training

10.4.1 The Idaho National Laboratory Emergency Response Organization

The INL Emergency Response Organization (ERO) structures are based on the incident command system and are described in PLN-114 and facility-specific addendums to that plan.

10.4.2 Role of Project Personnel in Emergencies

Depending on the event, a graded response and subsequent notifications will take place. FTL/STR and project personnel responsibilities are described below. Personnel will respond to emergencies only within the limits of their training and designated by their position. All personnel must be trained to the facility-specific emergency actions as part of the access training or will be escorted by someone who has been trained. Emergency response actions also will be covered as part of the HASP briefing as stated in Table 6-1.

Table 10-1. Project internal emergency signals.

Device or Communication Method	Signal and Associated Response
Vehicle horn blasts	**One long blast**—Emergency evacuation, evacuate project site immediately. Proceed in an upwind direction to designated assembly area as specified by the FTL/STR.
	Two short blasts—Nonemergency evacuation of immediate work area. Proceed to designated assembly area as specified by the FTL/STR.
	Three long blasts or verbally communicated—All clear, return to project site.

10.4.2.1 Field Team Leader. The FTL (or designated alternate) is responsible for initiating all requests for emergency services (e.g., fire and medical) and for notifying the construction coordinator of abnormal or potential emergency events that may occur during the project. The FTL will also serve as the area warden, or designate that responsibility to another person who has been trained as area warden, and will conduct personnel accountability. Personnel accountability will be reported to the shift supervisor. Additionally, the FTL will control the scene until a higher-tiered incident command system authority arrives at the scene to take control. When relinquishing this role, the FTL (or designated alternate) will provide all information about the nature of the event, potential hazards, and other information requested.

10.4.2.2 Project Personnel. Every person at the project site has a role to play during a project event or INL emergency. Each employee must be constantly aware of potential problems or unexpectedly hazardous situations and immediately report these situations to the FTL/STR. All personnel are expected to watch out for their fellow workers, to report their concerns to the FTL/STR, and to take emergency actions as described in this section. Roles and responsibilities are further detailed in Table 10-2.

10.4.2.3 Personnel Accountability and Area Warden. Project personnel are required to evacuate the site in response to TAKE COVER, EVACUATION, and local evacuation alarms. In all cases, the FTL/STR or trained designee will account for the people present on the project site. The FTL/STR or trained alternate will serve as the area warden for the project and will complete the personnel accountability following positive sweeps of the project site based on the attendance log. The results of this accountability will then be communicated to the FTL/STR for reporting to the shift supervisor or emergency coordinator if the command post has been formed.

10.4.2.4 Spills. If the material spilled is known and is small enough to be safely contained at the work site, work-site personnel will handle spill control using spill supplies at the site and immediately report the incident to the shift supervisor or WCC if the shift supervisor cannot be contacted. Reporting requirements will be determined by the facility emergency coordinator in accordance with MCP-190, "Event Investigation and Occurrence Reporting." If any release of a hazardous material occurs, work-site personnel will comply with the following immediate spill response actions.

Table 10-2. Responsibilities during an emergency.

Responsible Person	Action Assigned
Field team leader (or designee)	Signal evacuation
	Report spill to shift supervisor and take mitigative actions[a]
	Contact shift supervisor or Warning Communications Center (if the shift supervisor cannot be contacted)
Field team leader (or trained designee)	Serve as area warden and conduct accountability and report to shift supervisor
Health and safety officer and medic and first-aid-trained personnel	Administer first-aid to victims (voluntary basis only)
Truck drivers and equipment operators on the haul road.	As soon as possible, clear the haul road for emergency vehicles. Proceed to the nearest vehicle/equipment staging area, safely park their vehicles, and proceed as directed by the FTL, STR, or HSO.

a. The environmental affairs spill response categorization and notification team will be contacted by the shift supervisor or emergency coordinator.

10.4.2.4.1 Untrained Initial Responder—The requirements for the untrained initial responder, or if the material characteristics are unknown, are listed below:

- Place equipment in a safe configuration
- Evacuate and isolate the immediate area
- Notify and then seek help from and warn others in the area
- Notify the FTL/STR.

10.4.2.4.2 Trained Responder. The requirements for the trained responder where material characteristics are known and no additional PPE is required are listed below:

- Place all equipment in a secure configuration
- Seek help from and warn others in the area
- Stop the spill if it can be done without risk (e.g., returning the container to the upright position, closing valve, and shutting off power)
- Provide pertinent information to the FTL/STR
- Secure any release paths if it is safe to do so.

10.5 Medical Emergencies and Decontamination

Medical emergencies and responses to injuries or suspected exposures will be handled as stated in Section 8.2. Decontamination of personnel and equipment is described in Section 11.2.

10.6 Emergency Communications

In the event of an emergency, the capability to summon INL emergency response resources, to immediately notify site personnel, and to inform others of site emergencies is required. Communications equipment at the work site will be a combination of radios, telephones (e.g., mobile, cellular, or facility), and pagers. Communication methods described below will be used during emergency situations.

10.6.1 Notifications

During emergency situations, the facility shift supervisor will be notified of any project emergency event. The shift supervisor will then make the required ERO notification. The following information should be communicated, as available, to the shift supervisor:

- The caller's name, title (e.g., FTL/STR or HSO), telephone number, and pager number
- Exact location of the emergency
- Nature of the emergency, including time of occurrence, current site conditions, and special hazards in the area
- Injuries, if any, including numbers of injured, types of injuries, and conditions of injured
- Emergency response resources required (e.g., fire, hazardous material, and ambulance)
- Additional information as requested.

Note: If the shift supervisor cannot be contacted then the WCC will be notified of the event and the above information will be communicated. The WCC also must be told that notification to the facility shift supervisor and emergency coordinator has not been made.

10.7 Emergency Facilities and Equipment

Emergency response equipment maintained at the project site includes the items listed in Table 10-3. The INTEC facility-specific addendum to PLN-114 lists emergency equipment available at the facility. This includes the command post, self-contained breathing apparatus, dosimeters, air samplers, decontamination and first-aid equipment, and an emergency response trailer. The INL fire department maintains an emergency hazardous material response van that can be used to respond to an event or emergency at the project. Fire department personnel are also trained to provide immediate hazardous material spills and medical services. Additionally, the CFA-1612 medical facility is manned by medical personnel to evaluate and stabilize injured personnel or those experiencing signs and symptoms of exposure.

Note: Workers at CPP-37A and CPP-67 will assemble at the southeast staging area.

Table 10-3. Emergency response equipment to be maintained at the project site during operations.

Equipment Name and Quantity Required	Location at Work Site	Responsible Person	Frequency of Inspection or Verification[a]
First-aid kit	Project vehicle or near DWA or CWA	Health and safety officer (HSO)	Monthly: verify at least 50% of original contents are available for use
Eyewash bottles[b] Eyewash station[b]	In or near DWA or CWA	HSO	Monthly
Extra personal protective equipment[a]	Project vehicle or support trailer	HSO	Daily verification
Communication equipment (operational)[a]	Onsite	Field team leader	Daily radio check
Fire extinguishers[c]	In or near DWA or CWA	HSO	Monthly

a. This is verification that equipment is present at the project location before starting tasks and no inspection tag is required.
b. An eyewash bottle will be used to provide an immediate eye flush if required. The location of the eyewash station will be identified by the HSO during the prejob briefing.
c. A minimum of one 10A/60BC extinguisher is required. If it is discharged, it will be returned for servicing and recharging.

10.8 Evacuation Assembly Areas and Central Facilities Area Medical Facility

The INTEC maintains primary and secondary evacuation routes and assembly areas (see Figure 10-1). These routes may be used in response to a total facility area evacuation as directed by the emergency coordinator. Copies of the evacuation assembly areas and the CFA-1612 medical facility route (see Figure 10-2) will be available at the project site.

10.9 Reentry, Recovery, and Site Control

All reentry and recovery activities will follow general site security and control requirements identified in Section 7 unless conducted as part of an emergency response action. All entries to the project site performed in support of emergency actions will be controlled by the on-scene commander.

10.9.1 Reentry

During an emergency response it is sometimes necessary to reenter the scene of the event. Reasons for performing a reentry may include

- Performing personnel search and rescue
- Responding to medical first-aid needs
- Performing safe shutdown actions
- Performing mitigating actions

- Evaluating and preparing damage reports
- Performing radiation or hazardous material surveys.

Reentries will be carefully planned to ensure that personnel are protected from harm and to prevent initiating another emergency event. Reentry planning is undertaken as a graded approach depending on the nature of the initiating event.

10.9.2 Recovery

After the initial corrective actions have been taken and effective control established, response efforts will shift toward recovery. Recovery is the process of assessing postevent and postemergency conditions and developing a plan for returning to preevent and preemergency conditions, when possible, and following the plan to completion. The emergency coordinator and emergency action manager are responsible for determining when an emergency situation is sufficiently stable to terminate the emergency and enter the recovery phase. The project manager, with concurrence from the area SAD, will appoint the recovery manager.

10.10 Critique of Response and Follow-up

A review and critique will be conducted following all emergency events, drills, and exercises at the ICP. In some cases, an investigation may be required before commencing recovery actions. For this reason, care should be exercised to preserve evidence when appropriate.

10.11 Telephone and Radio Contact Reference List

Table 10-4 lists the points of contact for the project. A copy of this list will be kept in the FTL/STR logbook. Because personnel listed may change frequently, working copies of this list will be generated as required to note new positions and changes of personnel assigned. A Field Document Action Request (DAR) will be generated and the revised list posted to the FTL/STR logbook and distributed as warranted.

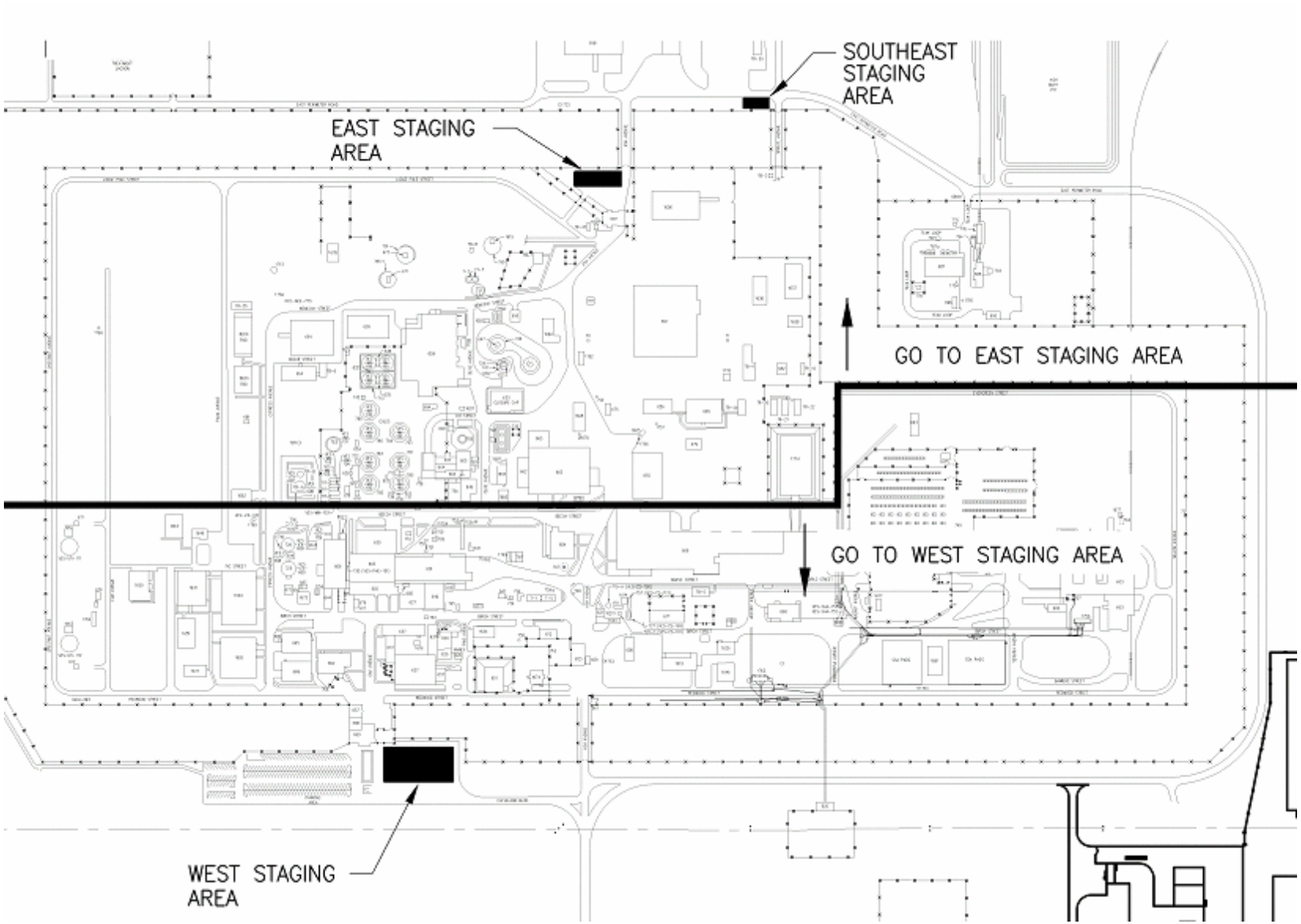


Figure 10-1. INTEC primary and secondary evacuation assembly areas.

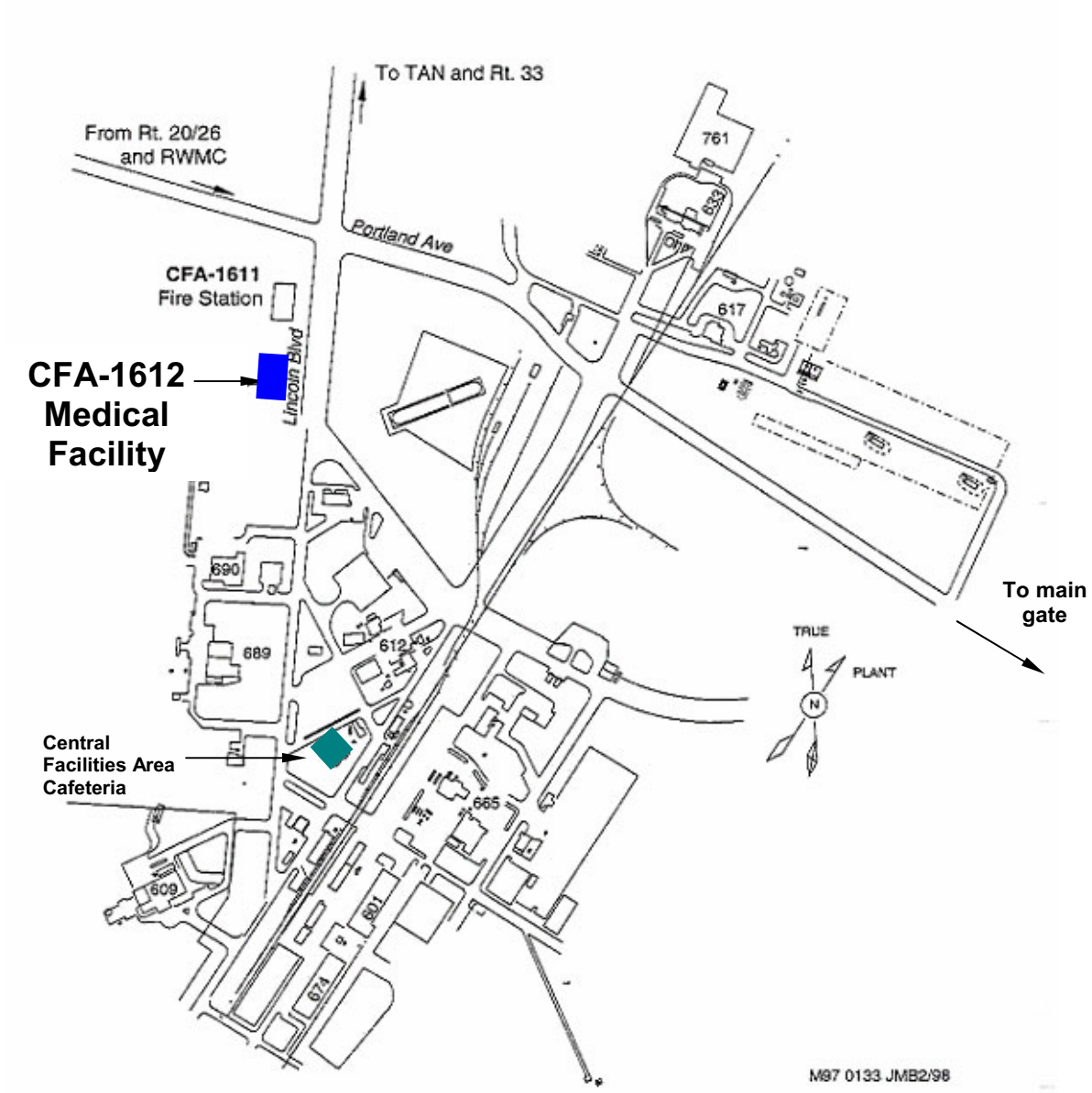


Figure 10-2. Map showing the route to the nearest medical facility (CFA-1612).

Table 10-4. Project emergency contact list.

Contact Title	Contact Name	Phone Number or Radio Net	Cellular Phone Number	Pager Number
Fire, medical emergency, and security Warning Communications Center	NA[a]	777 6-1515	NA	NA
Subcontract Technical Representative	Joseph Landis	6-6311	521-2323	6792
INTEC plant shift supervisor	Duty officer	6-3100	NA	2096
Facility authority	Paul Yela	6-8899	521-0876	6264
Environment, safety, and health manager	Corrinne Jones	6-8079	520-4191	5728
Radiological control supervisor	Allen Nellesen	6-6638	520-1226	5293
Radiological engineer	John Horton	6-0514		3379
Department of Energy Idaho Operations Office facility representative	Jerry McNew	526-5108	521-7394	7619
Misc. Sites Area Manager	L. Butler	6-9124	351-9260	4123
Group 3 Project Manager	R. Lee Davison	6-3770	520-3707	5744
Field team leader	Mark Varvel	6-4424	520-6023	5945
CWI Safety Engineer	Claude Pettengill	6-3975		
Industrial hygienist	John Welker	6-6446	521-0361	5752
INTEC Cleanup Project environmental compliance	Lee Tuott	6-7990	NA	7855

a. NA – not applicable.

11. DECONTAMINATION PROCEDURES

Every effort will be made to prevent contamination of personnel and equipment through the use of engineering controls, isolation of source materials, contaminant monitoring, personnel contamination control training, and following material handling requirements and procedures for contaminated or potentially contaminated materials. If contact with potentially contaminated surfaces cannot be avoided, then additional engineering controls, in combination with PPE upgrades, may be necessary to control the contact hazard. However, if chemical or radiological contamination is encountered at levels requiring decontamination, this section provides guidance on how it will be performed.

11.1 Contamination Control and Prevention

Contamination control and prevention procedures will be implemented to minimize personnel contact with contaminated surfaces if such surfaces are encountered or may be contacted during project tasks. The following contamination control and prevention measures will be employed if contamination is encountered or anticipated:

- Identify potential sources of contamination and design containment, isolation, and engineering controls to eliminate or mitigate any potential for contact or release of contaminants
- Limit the number of personnel, equipment, and materials that enter the contaminated area
- Implement immediate decontamination procedures to prevent the spread of contamination if contamination is found on the outer surfaces of equipment
- Use only the established control entry and exit point from the contaminated area to minimize the potential for cross-contamination and expedite contamination control surveys
- Wear disposable outer garments and use disposable equipment where possible
- Use hold points defined in procedures and work orders to monitor for contamination where anticipated.

11.2 Equipment and Personnel Decontamination

Personnel and equipment decontamination procedures are necessary to control contamination and to protect personnel should contamination be encountered. Both chemical and radionuclide contamination will be removed from surfaces of a contaminated area at the exit and other designated work area boundaries.

If radionuclide decontamination operations are required for equipment or areas, they will be performed in accordance with Chapter 4 of the Radiological Control Manual (PRD-183). Nonradionuclide decontamination will be evaluated by the HSO and project industrial hygienist, on a case-by-case basis, to determine the most appropriate level of PPE to be worn. An RWP will be generated if radiological contamination is encountered. Specific equipment and personnel decontamination methods are provided in the following subsections.

11.2.1 Equipment Decontamination

If radionuclide decontamination operations are required for equipment or areas, they will be performed in accordance with Chapter 4 of ICP Radiological Control Manual. Nonradionuclide decontamination will be evaluated on a case-by-case basis by the HSO and project industrial hygienist to determine the most appropriate PPE. Level C protective clothing will initially be selected if airborne contaminants may be generated until site monitoring can demonstrate downgrading is warranted.

A decontamination pad may be established if nonradionuclide decontamination is required before equipment can be released. If it is deemed necessary and appropriate by the project industrial hygienist, a wet wiping with an amended water solution (e.g., amended with a nonphosphate detergent such as Alconox) or a potential steam cleaning of this equipment may be conducted before it is allowed to leave the decontamination area. A drainage system that allows for a single collection point will be established if steam cleaning is performed. Decontamination wastewater will be collected using a submergible pump and containerized and characterized in accordance with companywide Manual 17, "Waste Management," and relevant MCPs.

11.2.2 Personnel Decontamination

Project activities will be conducted in Level D PPE unless upgrading is warranted. Engineering controls in conjunction with work controls and proper handling of samples will serve as the primary means to eliminate the need for personnel decontamination. If modified Level D protective clothing is required, all items will be inspected following the list in Section 5.

11.2.3 Decontamination in Medical Emergencies

If a person is injured or becomes ill, that person will be immediately evaluated by first-aid-trained personnel (on a voluntary basis) at the project work site. If the injury or illness is serious, then the FTL/STR will contact the INTEC construction coordinator or WCC (if the construction coordinator cannot be reached) to summon emergency services (i.e., fire department and CFA medical services) to the project site.

Medical care for serious injury or illness will not be delayed for decontamination. In such cases, gross decontamination may be conducted by removing the injured person's outer protective clothing, if possible, and other contaminated areas may be contained with a bag or glove. If contaminated PPE cannot be removed without causing further injury (except for the respirator, which must be removed), the individual will be wrapped in plastic, blankets, or other available material to help prevent contaminating the inside of the ambulance, medical equipment, and medical personnel.

The industrial hygienist or RCT (depending on the type of contamination) will accompany the employee to the medical facility to provide information and decontamination assistance to medical personnel. Contaminated PPE then will be removed at the CFA medical facility and carefully handled to prevent the spread of contamination. The ICP Radiation Protection Manual (PRD-183), Chapter 5, and MCP-148, "Personnel Decontamination," contains information on proper handling of radionuclide-contaminated wounds.

11.3 Doffing Personal Protective Equipment and Decontamination

As stated earlier, no personnel decontamination beyond doffing of PPE is anticipated for this project. Careful removal of the outer PPE will serve as the primary decontamination method.

The specific doffing sequence of modified Level D or C PPE, and associated decontamination procedures, will be based on the nature of the contamination. A general approach for doffing modified Level D or C PPE is described below. However, no one doffing strategy works for all circumstances. Modifications to this approach are appropriate if site conditions change or at the discretion of the project HSO in consultation with the project industrial hygienist and RCT.

11.3.1 Modified Level D Personal Protective Equipment Doffing and Decontamination (if Required)

If required to be worn, modified Level D protective clothing (e.g., disposable coveralls) will be doffed following standard radiological removal techniques (rolling outside surface inward and down) and will constitute the initial decontamination step. All PPE will be placed in the appropriately labeled containers.

11.3.2 Level C Personal Protective Equipment Doffing and Decontamination (if Required)

If respiratory protection is worn in conjunction with protective clothing (e.g., Level C PPE), then the modified Level D sequence will be followed with one additional step. That additional step is to remove the respirator and place it in a separate container from the discarded protective clothing. Depending on the type of contamination encountered, this step will be followed by a radiological survey or industrial hygienist evaluation.

11.4 Personnel Radiological Contamination Monitoring

An automated whole-body radiological survey may be required before exiting the OU 3-13, Group 3 work sites, as determined appropriate by RadCon personnel or as stated in the RWP. If required, this survey will be conducted using an existing personnel contamination monitor or other available hand-held instrument as directed by RadCon personnel.

11.4.1 Storage and Disposal of Investigation-Derived Waste Materials

Waste may include PPE and miscellaneous sampling materials (e.g., paper towels, plastic bags, and gloves). If contaminated, the waste will be bagged, secured with duct tape, labeled, and discarded as directed by the RCT. It is expected that the waste will be handled as conditional industrial waste to comply with the waste disposal and disposition form. Free release surveys of suspected radiologically contaminated waste will be conducted in compliance with MCP-425.

Cold (nonradiological) waste is sent to the CFA Landfill or another ICP-designated solid-waste landfill. Low-level radioactive waste is stored in the radioactive material area of the designated CERCLA cargo container in accordance with MCP-3475, “Temporary Storage of CERCLA-Generated Waste at the ICP.” The waste will be evaluated for additional characterization and managed as low-level waste. Final disposition will be coordinated with Waste Generator Services.

11.4.2 Site Sanitation and Waste Minimization

Site personnel will use the portable toilet facilities provided or other designated sanitation facilities in the INTEC area. Potable water and soap are available in these areas for personnel to wash their hands and faces upon exiting the DWA or CWA.

Waste materials will not be allowed to accumulate at OU 3-13, Group 3 sites. Appropriately labeled containers for industrial waste and CERCLA waste (as required) will be maintained at the project site, as stated in the Operable Unit 3-13, Group 3, Other Surface Soils Remediation Sets 1-3 (Phase I) Field Sampling Plan (DOE-ID 2004b) (Attachment 1 of the Group 3 RD/RA Work Plan submittal [DOE-ID 2004a]). Personnel should make every attempt to minimize waste through the judicious use of consumable materials. All site personnel are expected to make good housekeeping a priority at the job site.

12. RECORDKEEPING REQUIREMENTS

12.1 Industrial Hygiene and Radiological Monitoring Records

When Industrial Hygiene support is required, the industrial hygienist will record airborne monitoring and sampling data (both area and personal) collected for exposure assessments in the ICP Hazards Assessment and Sampling System database. All monitoring and sampling equipment will be maintained and calibrated in accordance with ICP procedures and the manufacturer specifications. Industrial hygiene airborne monitoring and sampling exposure assessment data are treated as limited access information and maintained by the industrial hygienist in accordance with ICP companywide safety and health manual procedures.

Radiological control personnel maintain records of radiological monitoring, daily project operational activities, and instrument performance checks in accordance with companywide Manual 15B, "Radiation Protection Procedures."

Project personnel or their representatives have a right to the monitoring and sampling data (both area and personal) from both the industrial hygienist and the RCT. Results from monitoring data also will be communicated to all field personnel during daily POD meetings and formal prejob briefings, in accordance with MCP-3003.

12.2 Field Team Leader and Sampling Logbooks

Logbooks will be maintained in accordance with MCP-1194. The FTL will keep a record of daily site events in the FTL logbook and will maintain accurate records of all personnel (e.g., workers and nonworkers) who are onsite each day in a site attendance logbook. Logbooks must be obtained from the field data coordinator for the INL Sample and Analysis Management. The completed logbooks must be returned to the INL Sample and Analysis Management within 6 weeks of project completion. The logbooks are then submitted to ICP Document Control.

12.3 Document Control

Document Control organizes and maintains data and reports generated by Clean/Close Project field activities. Document Control maintains a supply of all controlled documents and provides a system for the control and release of controlled documents, reports, and records.

Completed sample logbooks are submitted to Sample and Analysis Management within 6 weeks of project completion. All other project records and logbooks, except Industrial Hygiene logbooks, must be forwarded to Administrative Records and Document Control (ARDC) within 30 days after completion of field activities.

12.4 Site Attendance Record

If required to be maintained separately, the site attendance record will be used to keep a record of all personnel (i.e., field team members and nonfield team members) onsite each day and to assist the area warden with conducting personnel accountability should an evacuation take place (see Section 10 for emergency evacuation conditions). Personnel will only be required to sign in and out of the attendance record once each day. The FTL/STR is responsible for maintaining the site attendance record and for ensuring that all personnel on the project site sign in (if required).

12.5 Administrative Record and Document Control Office

The ARDC office will organize and maintain data and reports generated by ICP field activities. ARDC maintains a supply of all controlled documents and provides a system for the control and release of controlled documents, reports, and records. Copies of the management plans for the ICP, this HASP, the ICP Project Execution Plan (PLN-694), the Quality Assurance Project Plan (DOE-ID 2002), and other documents pertaining to this work are maintained in the project file by the ARDC office.

13. REFERENCES

Note: The referenced documentation in this section refers to the current revision of the document.

10 CFR 835, "Occupational Radiation Protection," *Code of Federal Regulations*, Office of the Federal Register.

10 CFR 835, Subpart C, "Standards for Internal and External Exposure," *Code of Federal Regulations*, Office of the Federal Register.

10 CFR 835.603(b), "High radiation area," *Code of Federal Regulations*, Office of the Federal Register.

10 CFR 835.603(d), "Airborne radioactive area," *Code of Federal Regulations*, Office of the Federal Register.

29 CFR 1910, "Occupational Safety and Health Standards," *Code of Federal Regulations*, Office of the Federal Register,.

29 CFR 1910.120, "Hazardous waste operations and emergency response," *Code of Federal Regulations*, Office of the Federal Register.

29 CFR 1910.120(f)(7), "Physician's written opinion," *Code of Federal Regulations*, Office of the Federal Register.

29 CFR 1910.132, "General requirements," *Code of Federal Regulations*, Office of the Federal Register.

29 CFR 1910.134, "Respiratory protection," *Code of Federal Regulations*, Office of the Federal Register.

29 CFR 1910.178, "Powered industrial trucks," *Code of Federal Regulations*, Office of the Federal Register.

29 CFR 1910.1000, "Air contaminants," *Code of Federal Regulations*, Office of the Federal Register.

29 CFR 1910.1025, "Lead," *Code of Federal Regulations*, Office of the Federal Register.

29 CFR 1910.1027, "Cadmium," *Code of Federal Regulations*, Office of the Federal Register.

29 CFR 1926, Subpart P, "Excavations," *Code of Federal Regulations*, Office of the Federal Register.

29 CFR 1926, Subpart P, Appendix B, "Sloping and Benching," *Code of Federal Regulations*, Office of the Federal Register.

29 CFR 1926.65, "Hazardous waste operations and emergency response," *Code of Federal Regulations*, Office of the Federal Register.

42 USC § 9601 et seq., 1980, "Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA/Superfund)," *United States Code*.

ACGIH, *Threshold Limit Values Booklet*, American Conference of Governmental Industrial Hygienists.

ANSI S1.25, "Specification for Personal Noise Dosimeters," American National Standards Institute.

ANSI Z41.1, “Men’s Safety-Toe Footwear,” American National Standards Institute.

ANSI Z87.1, “Occupational and Educational Personal Eye and Face Protection Devices,” American National Standards Institute.

ANSI Z89.1, “Requirements for Industrial Head Protection,” American National Standards Institute.

DOE O 151.1A, “Comprehensive Emergency Management System,” U.S. Department of Energy.

DOE O 231.1A, “Environment, Safety, and Health Reporting,” U.S. Department of Energy.

DOE O 440.1, “Worker Protection Management for DOE Federal and Contractor Employees,” U.S. Department of Energy.

DOE-ID, 1991, *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory,* U.S. Department of Energy Idaho Operations Office; U.S. Environmental Protection Agency, Region 10; State of Idaho Department of Health and Welfare, December 1991.

DOE-ID, 1999, *Final Record of Decision, Idaho Nuclear Technology and Engineering Center* DOE/ID-10660, U.S. Department of Energy Idaho Operations Office; U.S. Environmental Protection Agency, Region X; Idaho Department of Environmental Quality, October 1999.

DOE-ID, 2002, *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10 and Inactive Sites*, DOE/ID-10587, U.S. Department of Energy Idaho Operations Office, September 2002.

DOE-ID, 2003, *Waste Management Plan for the Staging and Storage Annex (CPP-1789)*, DOE/ID-10800, U.S. Department of Energy Idaho Operations Office, July 2003.

DOE-ID, 2004a, *Operable Unit 3-13, Group 3, Other Surface Soils Remediation Sets 1–3 (Phase I) Remedial Design/Remedial Action Work Plan*, DOE/ID-11089, U.S. Department of Energy Idaho Operations Office, January 2004.

DOE-ID, 2004b, *Operable Unit 3-13, Group 3, Other Surface Soils Remediation Sets 1–3 (Phase I) Field Sampling Plan*, DOE/ID-11091, U.S. Department of Energy Idaho Operations Office, January 2004.

DOE-ID, 2004c, *Operable Unit 3-13, Group 3, Other Surface Soils Remediation Sets 1–3 (Phase I) Waste Management Plan*, DOE/ID-11092, U.S. Department of Energy Idaho Operations Office, January 2004.

DOE-ID, 2004d, *Operable Unit 3-13, Group 3, Other Surface Soils Remediation Sets 1–3 (Phase I) Characterization Plan*, DOE/ID-11090, U.S. Department of Energy Idaho Operations Office, January 2004.

DOE-STD-1090-01, “Hoisting and Rigging,” U.S. Department of Energy.

Form 361.24, 2000, “Tailgate Attendance Roster,” Idaho National Engineering and Environmental Laboratory.

Form 361.25, 1999, “Group Read and Sign Training Roster,” Idaho National Engineering and Environmental Laboratory.

Form 361.47, 2001, "HWO Supervised Field Experience Verification," Idaho National Engineering and Environmental Laboratory.

Form 412.11, 2002, "Document Management Control Systems (DMCS) Document Action Request (DAR)," Idaho National Engineering and Environmental Laboratory.

Form 432.57, 1998, "Excavation Checklist," Idaho National Engineering and Environmental Laboratory.

Form 433.01, 2002, "Outage Request," Idaho National Engineering and Environmental Laboratory

Form 540.10, 2003, "Subcontractor Requirements Manual (SRM) Applicability," Idaho National Engineering and Environmental Laboratory.

GDE-6212, 2003, "Hazard Mitigation Guide for Integrated Work Control Process," Idaho National Engineering and Environmental Laboratory.

Idaho National Laboratory, *INL Training Directorate*, http://train1.inel.gov/, Web page visited May 10, 2005.

Manual 14A, "Safety and Health—Occupational Safety and Fire Protection," Idaho National Engineering and Environmental Laboratory.

Manual 14B, "Safety and Health–Occupational Medical and Industrial Hygiene," Idaho National Engineering and Environmental Laboratory.

Manual 15B, "Radiation Protection Procedures," Idaho National Engineering and Environmental Laboratory,.

Manual 15C, "Radiological Control Procedures," Rev. 48, Idaho National Engineering and Environmental Laboratory.

Manual 17, "Waste Management," Idaho National Engineering and Environmental Laboratory,.

MCP-7, "Radiological Work Permit," Idaho National Engineering and Environmental Laboratory.

MCP-8, "Performing Management Assessments and Management Reviews," Idaho National Engineering and Environmental Laboratory.

MCP-93, "Health Physics Instrumentation, Idaho National Engineering and Environmental Laboratory.

MCP-137, "Radioactive Source Accountability and Control," Idaho National Engineering and Environmental Laboratory.

MCP-139, "Radiological Surveys," Idaho National Engineering and Environmental Laboratory.

MCP-148, "Personnel Decontamination," Idaho National Engineering and Environmental Laboratory.

MCP-153, "Industrial Hygiene Exposure Assessment," Idaho National Engineering and Environmental Laboratory.

MCP-190, "Event Investigation and Occurrence Reporting," Idaho National Engineering and Environmental Laboratory.

MCP-425, “Radiological Release Surveys and the Control and Movement of Contaminated Materials,” Idaho National Engineering and Environmental Laboratory.

MCP-432, “Radiological Personal Protective Equipment,” Idaho National Engineering and Environmental Laboratory.

MCP-553, “Stop Work Authority,” Idaho National Engineering and Environmental Laboratory.

MCP-579, “Performing Fire Hazards Analysis,” Idaho National Engineering and Environmental Laboratory.

MCP-1143, “Hoisting and Rigging INTEC Supplement to PRD-160,” Idaho National Engineering and Environmental Laboratory,.

MCP-1194, “Logbook Practices for ER and D&D&D Projects,” Idaho National Engineering and Environmental Laboratory.

MCP-2703, “Carcinogens,” Idaho National Engineering and Environmental Laboratory.

MCP-2704, “Controlling Exposure to Heat and Cold Stress,” Idaho National Engineering and Environmental Laboratory.

MCP-2707, “Compatible Chemical Storage,” Idaho National Engineering and Environmental Laboratory.

MCP-2719, “Controlling and Monitoring Exposure to Noise,” Idaho National Engineering and Environmental Laboratory.

MCP-2725, “Field Work at the INEEL,” Idaho National Engineering and Environmental Laboratory.

MCP-2726, “Respiratory Protection,” Idaho National Engineering and Environmental Laboratory.

MCP-2739, “Material Handling, Storage, and Disposal,” Idaho National Engineering and Environmental Laboratory.

MCP-2745, “Heavy Industrial Vehicles,” Idaho National Engineering and Environmental Laboratory.

MCP-2749, “Confined Spaces,” Idaho National Engineering and Environmental Laboratory.

MCP-2750, “Preventing Hantavirus Infection,” Idaho National Engineering and Environmental Laboratory.

MCP-3003, “Performing Pre-job Briefings and Documenting Feedback,” Idaho National Engineering and Environmental Laboratory.

MCP-3449, “Safety and Health Inspections,” Idaho National Engineering and Environmental Laboratory.

MCP-3475, “Temporary Storage of CERCLA-Generated Waste at the INEEL,” Idaho National Engineering and Environmental Laboratory.

MCP-3562, “Hazard Identification Analysis and Control of Operational Activities,” Idaho National Engineering and Environmental Laboratory.

MCP-3650, “Chapter IX Level I Lockouts and Tagouts,” Idaho National Engineering and Environmental Laboratory.

MCP-3651, “Chapter IX Level II Lockouts and Tagouts,” Idaho National Engineering and Environmental Laboratory.

MCP-6501, “Hoisting and Rigging Operations,” Idaho National Engineering and Environmental Laboratory.

MCP-6502, “Hoisting and Rigging Maintenance,” Idaho National Engineering and Environmental Laboratory.

MCP-6503, “Inspection and Testing of Hoisting and Rigging Equipment,” Idaho National Engineering and Environmental Laboratory.

MCP-6504, “Hoisting and Rigging Lift Determination and Lift Plan Preparation,” Idaho National Engineering and Environmental Laboratory.

MCP-6505, “Hoisting and Rigging Training,” Idaho National Engineering and Environmental Laboratory.

NFPA, *Electrical Safety Requirements for Employee Work Places*, NFPA 70E, National Fire Protection Association.

NIOSH, 1985, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, National Institutional of Occupational Safety and Health/Occupational Safety and Health Administration/United States Coast Guard/U.S. Environmental Protection Agency, DHHS (NIOSH) Publication No. 85-115.

PLN-114, “INEEL Emergency Plan RCRA Contingency Plan,” Idaho National Engineering and Environmental Laboratory.

PLN-694, “Project Execution Plan for the Balance of INEEL Cleanup Project,” Idaho National Engineering and Environmental Laboratory.

PRD-5, “Boilers and Unfired Pressure Vessels,” Idaho National Engineering and Environmental Laboratory.

PRD-22, “Excavation and Surface Penetrations,” Idaho National Engineering and Environmental Laboratory.

PRD-25, “Activity Level Hazard Identification, Analysis, and Control,” Idaho National Engineering and Environmental Laboratory.

PRD-183, “Radiation Protection – INEEL Radiological Control Manual,” Idaho National Engineering and Environmental Laboratory.

PRD-308, “Handling and Use of Flammable and Combustible Liquids,” Idaho National Engineering and Environmental Laboratory.

PRD-600, “Maintenance Management Requirements,” Idaho National Engineering and Environmental Laboratory.

PRD-1004, “Stop Work Authority,” Idaho National Engineering and Environmental Laboratory.

PRD-1007, “Work Coordination and Hazard Control,” Idaho National Engineering and Environmental Laboratory.

PRD-2001, “Personal Protective Equipment,” Idaho National Engineering and Environmental Laboratory.

PRD-2002, “Fall Protection,” Idaho National Engineering and Environmental Laboratory.

PRD-2003, “Ladders,” Idaho National Engineering and Environmental Laboratory.

PRD-2004, “Scaffolding,” Idaho National Engineering and Environmental Laboratory.

PRD-2005, “Walking and Working Surfaces,” Idaho National Engineering and Environmental Laboratory.

PRD-2007, “Hoisting and Rigging,” Idaho National Engineering and Environmental Laboratory.

PRD-2009, “Compressed Gases,” Idaho National Engineering and Environmental Laboratory

PRD-2010, “Welding, Cutting, and Other Hot Work,” Idaho National Engineering and Environmental Laboratory.

PRD-2011, 2000, “Electrical Safety,” Idaho National Engineering and Environmental Laboratory.

PRD-2014, 2001, “Excavations and Surface Penetrations,” Idaho National Engineering and Environmental Laboratory.

PRD-2015, 2003, “Hand and Portable Power Tools,” Idaho National Engineering and Environmental Laboratory.

PRD-2016, 2003, “Material Handling, Storage, and Disposal,” Idaho National Engineering and Environmental Laboratory.

PRD-2019, 1998, “Motor Vehicle Safety,” Idaho National Engineering and Environmental Laboratory.

PRD-2020, 2001, “Heavy Industrial Vehicles,” Idaho National Engineering and Environmental Laboratory.

PRD-2022, 1998, “Safety Signs, Color Codes, and Barriers,” Idaho National Engineering and Environmental Laboratory.

PRD-2107, 2003, “Heat and Cold Stress,” Idaho National Engineering and Environmental Laboratory.

PRD-2108, 2001, “Hearing Conservation,” Idaho National Engineering and Environmental Laboratory.

PRD-2109, 2003, “Respiratory Protection,” Idaho National Engineering and Environmental Laboratory.

PRD-2201, “Flammable and Combustible Liquid Storage,” Idaho National Engineering and Environmental Laboratory.

PRD-5096, “Fall Protection,” Idaho National Engineering and Environmental Laboratory.

PRD-5098, “Scaffolding,” Idaho National Engineering and Environmental Laboratory.

PRD-5099, “Electrical Safety,” Idaho National Engineering and Environmental Laboratory.

PRD-5101, “Portable Equipment and Handheld Power Tools,” Idaho National Engineering and Environmental Laboratory.

PRD-5103, “Walking and Working Surfaces,” Idaho National Engineering and Environmental Laboratory.

PRD-5110, “Welding, Cutting, and Other Hot Work,” Idaho National Engineering and Environmental Laboratory.

PRD-5117, “Accident Prevention Signs, Tags, Barriers, and Color Codes,” Idaho National Engineering and Environmental Laboratory.

PRD-5121, “Personal Protective Equipment,” Idaho National Engineering and Environmental Laboratory.

PRD-5123, “Motor Vehicle Safety,” Idaho National Engineering and Environmental Laboratory.

Rood, S. M., G. A. Harris, and G. J. White, 1996, *Executive Summary for Background Dose Equivalent Rates and Surficial Soil Metal and Radionuclide Concentrations for the Idaho National Engineering Laboratory*, INEL-94/0250, Rev. 1, Idaho National Engineering and Environmental Laboratory, Lockheed Martin Idaho Technologies Company, Idaho Falls, Idaho.

STD-101, “Integrated Work Control Process,” Idaho National Engineering and Environmental Laboratory.

TOC-59, “Subcontractor Requirements Manual,” Idaho National Engineering and Environmental Laboratory.